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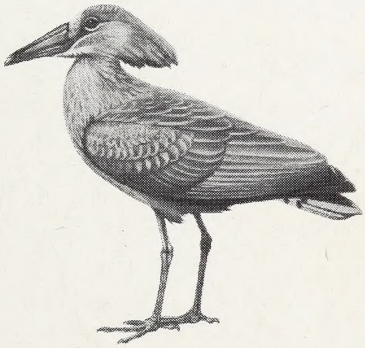

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Authors are asked to follow the conventions used in *Scopus* and to refer to a recent issue for guidance. Metric units should be used. A few examples of conventions are: **dates:** 23 September 1991 [note the order, no comma, not '23rd']; **names of birds:** Cape Rook *Corvus capensis* [no comma, no parentheses, no author's name]; **list of**

Continued inside back cover

Scopus 19: 1–8, June 1995

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A preliminary account of the avifauna of Kahe II Forest Reserve, Tanzania

Norbert J. Cordeiro, Thomas Lehmberg and Jacob Kiure

Birds were surveyed by all authors in Kahe II Forest Reserve (FR) about 20 km to the south of Moshi (37°27E, 03°28S), Tanzania, from 16–18 August 1993. NJC also visited this forest reserve on 27 July and 18 August 1994. Methods used were mist-netting and direct observation. Kahe II FR, located at 660 m a.s.l., covers an area of 202 ha and is an extension of the larger Kahe I FR which is 885 ha (S.S. Kashenge, pers. comm.). This note presents recent ornithological results from Kahe II FR, including species of interest and a species list. It is also imperative to note that these forest reserves probably serve as an important refuge for the rarely encountered Banded Snake Eagle *Circaetus cinerascens* and harbour a Marabou Stork *Leptoptilos crumeniferus* nesting colony, being one of the few known sites in Tanzania (Baker 1989). In addition, some highland birds may also use and need these forests in the cold season.

Background and brief description of study areas

The Kahe area appears to have received some ornithological attention by explorers visiting Mt Kilimanjaro in the late 1800s and early 1900s. Several people collected birds at "Kahe" although specific information on the habitat was seldom mentioned. Notable collectors include W. L. Abbott (Oberholser 1905), G. A. Fischer, F. J. Jackson, O. Neumann, C. G. Schillings and Y. Sjöstedt (reviewed in Sjöstedt (1910)). R. E. Moreau also collected at Kahe (Moreau & Moreau 1937). Recent avifaunal studies on this forest seem lacking.

This dry forest is mainly riverine and contains fairly large old *Ficus* trees, some reaching girths of over 2 m. The bulk of it is secondary in nature, a result of extensive past and current human activities which include logging, charcoal burning and fuelwood and pole collecting. It is surrounded by several small village communities whose residents use the forest for the above-mentioned reasons. There has also been some degree of encroachment on the reserve by these communities who farm maize, beans, cassava, bananas, millet and rice. The Rau River, which once used to meander through this reserve, was rechannelled by NAFCO for irrigation purposes in the area during the 1960s (J.S. Msangi, pers. comm.).

Methods

Mist nets were used to sample the understorey species that may have been overlooked because of their inconspicuous nature. Two netting sites were set up in reasonably dense undergrowth along a dry river bed at the north end of the forest. Ten nets were operated from dawn to dusk and birds were removed every half hour or hour depending on the capture rates. Birds were fitted with Eastern African Ringing Scheme rings and standard biometric measurements were taken. The moult and brood patch scores were also noted.

Direct observation and the recording of bird calls was also employed in the field for

species at all levels of the forest. TL surveyed the forest by field observation during the day whereas NJC and JK alternatively switched between mist-netting and direct observation after every 2–3 h.

Results

Mist-netting

A total of 37 birds comprising 12 species were ringed in 3045 net-metre-hours of surveillance (Table 1). The Olive Grey Greenbul *Phyllastrephus cerviniventris* was the most abundant understorey species. Breeding records of some species were opportunistically obtained. Large brood patches of *4* and *5* indicate probable breeding, whereas similar scores with scaly or refeathering breasts suggest that the bird had completed sitting on eggs (Baker 1993). Of those ringed, seven had recently nested whereas five were probably incubating or rearing fledglings (Table 1).

Table 1. *Numbers of birds ringed by species and individuals indicating current or recent breeding activity*

Species	No. ringed	Brood patch of *4, 5*
Zanzibar Sombre Greenbul *Andropadus importunus*	1	*4*
Little Greenbul *A. virens*	1	
Olive Grey Greenbul *Phyllastrephus cerviniventris*	10	
Northern Brownbul *P. strepitans*	2	*4*s, *5*s
Red-capped Robin Chat *Cossypha natalensis*	5	
White-starred Forest Robin *Pogonocichla stellata*	4	
Grey-backed Camaroptera *Camaroptera brachyura*	1	*4*
Crested Flycatcher *Trochocercus cyanomelas*	2	*4, 5*
Paradise Flycatcher *Terpsiphone viridis*	1	
Olive Sunbird *Nectarinia olivacea*	4	*5*
Grosbeak Weaver *Amblyospiza albifrons*	2	*4*s, *5*s
Peters' Twinspot *Hypargos niveoguttatus*	4	*4, 5, 4*rf

Note: Under brood patch, an "s" = scaly and "rf" = refeathering, both indications of recent breeding activity.

Forest Reserve records

The following section is divided into an annotated list of species of interest, followed by a table of all the species recorded in or at the edge of the reserve. The following species are of interest because of their range extensions in Tanzania or the limited knowledge that is available on their behaviour.

Marabou Storks *Leptoptilos crumeniferus*

Very few breeding sites of this stork are known from East Africa (Baker 1989). Baker (1989) notes a breeding population in Moshi and asked for further information on breeding colonies in an effort to promote its conservation. A small colony probably

still exists in the Rau Groundwater FR (pers. obs. 1986: NJC) at Moshi and another was located at Kahe II FR consisting of at least five nests which are in potential danger from tree-cutting activities.

Banded Snake Eagle *Circaetus cinerascens*
One was possibly seen and another definitely heard in 1993. Another individual was observed at the forest edge on 18 August 1994. This raptor was previously noted from the riverine forests close to Kahe (N. E. Baker, pers. comm.).

Crowned Eagle *Stephanoaetus coronatus*
An occupied nest with at least one chick was located near a dried-up river in the forest in 1993. The nest was situated in the fork of a large, old fig tree at a height of approximately 30–35 m. Adult birds were seen taking prey to the nest: skeletal remains of at least three species of primates and a duiker were collected in 1993 and 1994 and are currently being studied (K. M. Howell *in litt.*). The prey species possibly included the Black and White Colobus *Colobus guereza*, Blue Monkey *Cercopithecus mitis*, a galago and Red Duiker *Cephalophus harveyi*.

On 17 August at about 08:15, Olive Baboons *Papio cynocephalus anubis* were feeding on figs in and below two large fig trees, one of which contained the nest. An adult male baboon fed within 5–10 m of the nest. The baboon was not attacked by the eagle, despite records of such attacks on humans in the past (e.g., Oulton 1938).

Yellowbill *Ceuthmochares aereus*
One was seen skulking in a middle-storey tree. Britton (1980) does not note it from Kahe or the Kilimanjaro hinterland although, in addition to our record, it has been recorded from the area recently (J. M. Grimshaw *in* Cordeiro 1994) and in the past by van Someren. Two female specimens collected in Moshi by van Someren exist in the Field Museum of Natural History, Chicago (pers. obs.: specimen No. 193480, 12 July 1920 and No. 193481, 11 June 1920).

Alpine Swift *Apus melba*
A small flock was seen flying over the forest. Regular parties were seen through most of August in Moshi where heavy clouds on the mountain probably caused them to forage at lower altitudes (850–1500 m).

Greenbuls Pycnonotidae
Andropadus importunus, A. virens, Phyllastrephus cerviniventris and *P. strepitans* were located at Kahe. *P. strepitans* and *P. cerviniventris* associated in mixed flocks, the latter being more prevalent. *A. importunus* was seen twice and netted once. *A. virens* appeared scarce.

White-starred Forest Robin *Pogonocichla stellata*
Four of the Kilimanjaro race *guttifer* were netted in 1993 and one was seen and heard in July and August 1994, respectively. This species is known to move from high to low elevations during the cold season, which includes the study period, and vice versa during the warm season (Oatley 1982, Dowsett 1985, Dowsett-Lemaire 1989). The

race *guttifer* is only known from Kilimanjaro whereas *helleri* occupies the other closest locality to Kahe, Lossogonoi (Britton 1980). Hence, it is possible that these individuals came down from Mt Kilimanjaro although, at this stage, one cannot rule out that they may represent a resident population.

Lead-coloured Flycatcher *Myioparus plumbeus*
Seen at least three times foraging in pairs, mainly in small glades at the mid-stratum level.

Grosbeak Weaver *Amblyospiza albifrons*
Females were seen feeding on figs or resting in the canopy whereas another two were netted on the ground as they searched for fallen figs.

Table 2. *List of birds recorded in or flying over Kahe II FR. Other species recorded by previous workers from "Kahe" are probably from Kahe I or II FRs and are also listed. Nomenclature and systematics follows Britton (1980) and Turner* et al. *(1991)*

Species	Habitat used and other notes
Hamerkop *Scopus umbretta*	Forest edge (nest with 2 chicks August, 1994)
Marabou Stork *Leptoptilos crumeniferus*	Forest/woodland (breeding colony)
Hadada *Bostrychia hagedash*	Forest edge
Palm-nut Vulture *Gypohierax angolensis*	Flying over forest
African White-backed Vulture *Gyps africanus*	Forest/woodland
Hooded Vulture *Necrosyrtes monachus*	Flying over forest
Banded Snake Eagle *Circaetus cinerascens*	Forest
Little Sparrowhawk *Accipiter minullus*	Forest edge/woodland
African Goshawk *Accipiter tachiro*	Forest/woodland
Augur Buzzard *Buteo augur*	Forest/woodland
African Hawk Eagle *Hieraaetus spilogaster*	Forest/woodland
Lizard Buzzard *Kaupifalco monogrammicus*	Forest edge/woodland
Long-crested Eagle *Lophaetus occipitalis*	Forest/woodland
Crowned Eagle *Stephanoaetus coronatus*	Forest
Crested Guineafowl *Guttera pucherani*	Forest (feathers found in 1993 and 1994)
Tambourine Dove *Turtur tympanistria*	Forest/woodland
Red-eyed Dove *Streptopelia semitorquata*	Forest edge/woodland
African Green Pigeon *Treron calva*	Forest/ forest edge
Klaas' Cuckoo *Chrysococcyx klaas*	Forest/woodland
Red-chested Cuckoo *Cuculus solitarius*	Forest/woodland
Yellowbill *Ceuthmochares aereus*	Forest
White-browed Coucal *Centropus superciliosus*	Forest/woodland
African Wood Owl *Strix woodfordii*	Forest
Alpine Swift *Apus melba*	Forest/woodland (flying over)
Palm Swift *Cypsiurus parvus*	Forest/woodland (flying over)
Bar-tailed Trogon *Apaloderma vittatum*	collected by Hunter (*in* Sjöstedt 1910)

Species	Habitat used and other notes
Pygmy Kingfisher *Ispidina picta*	Forest edge/woodland
Brown-hooded Kingfisher *Halcyon albiventris*	Forest/woodland
Green Wood Hoopoe *Phoeniculus purpureus*	Forest
Silvery-cheeked Hornbill *Bycanistes brevis*	Forest
Trumpeter Hornbill *B. bucinator*	Forest
Crowned Hornbill *Tockus alboterminatus*	Forest/woodland
White-eared Barbet *Stactolaema leucotis*	Forest/forest edge
Tinkerbird species *Pogoniulus* sp.	Forest/forest edge
Eastern Honeybird *Prodotiscus zambesiae*	Forest edge
African Broadbill *Smithornis capensis*	Collected by Neumann (*in* Sjöstedt 1910)
Black Rough-wing *Psalidoprocne pristoptera*	Forest
Black-headed Oriole *Oriolus larvatus*	Forest/woodland
Zanzibar Sombre Greenbul *Andropadus importunus*	Forest/forest edge
Little Greenbul *A. virens*	Forest
Nicator *Nicator chloris*	Moreau & Moreau (1937)
Grey-olive Greenbul *Phyllastrephus cerviniventris*	Forest
Northern Brownbul *P. strepitans*	Forest/woodland
Red-capped Robin Chat *Cossypha natalensis*	Forest
White-starred Forest Robin *Pogonocichla stellata*	Forest
Black-headed Apalis *Apalis melanocephala*	Forest
Grey-backed Camaroptera *Camaroptera brachyura*	Forest/forest edge
Lead-coloured Flycatcher *Myioparus plumbeus*	Forest glades
Black-throated Wattle-eye *Platysteira peltata*	Forest
Paradise Flycatcher *Terpsiphone viridis*	Forest
Crested Flycatcher *Trochocercus cyanomelas*	Forest
Black-backed Puffback *Dryoscopus cubla*	Forest/woodland
Collared Sunbird *Anthreptes collaris*	Forest/woodland
Amethyst Sunbird *Nectarinia amethystina*	Forest/woodland
Olive Sunbird *N. olivacea*	Forest
Yellow White-eye *Zosterops senegalensis*	Forest/woodland
Grosbeak Weaver *Amblyospiza albifrons*	Forest/woodland
Peters' Twinspot *Hypargos niveoguttatus*	Forest
Yellow-rumped Seed-eater *Serinus atrogularis*	Forest/woodland
African Citril *S. citrinelloides*	Forest edge/woodland

Non-forest species recorded near Kahe II Forest Reserve

Various species were recorded just outside the forest and within about a 3-km radius of the reserve. Table 2 is a list of all the species that we recorded during our survey and includes those made by earlier collectors that were not recorded by us.

Preliminary conservation notes

The rechannelling of the Rau River may eventually cause the drying of Kahe II FR. The river now flows in a canal outside the forest which probably forces animals to leave the forest in search of water. Since the forest is virtually surrounded by small villages, this probably hinders such movements and may cause some conflict between humans and wild animals.

contd p. 7

Table 3. *Systematic list of all non-forest species recorded from the Kahe area during the survey, including other dated records from the literature. An 'x' denotes that a species was recorded at Kahe during the survey*

Species	Recorded in this survey, past records of bird collectors and other notes
Pink-backed Pelican *Pelecanus rufescens*	Schillings (*in* Sjöstedt 1910)
Saddle-billed Stork *Ephippiorhynchus senegalensis*	one in rice paddies near Chekereni, 18 Aug 1993
Black-headed Heron *Ardea melanocephala*	x
Cattle Egret *Bubulcus ibis*	x
Little Egret *Egretta garzetta*	x
Brown Snake Eagle *Circaetus cinereus*	x
Short-toed Snake Eagle *C. gallicus*	x
Black Kite *Milvus migrans*	x
Pygmy Falcon *Polihierax semitorquatus*	Abbott (*in* Oberholser 1905)
Vulturine Guineafowl *Acryllium vulturinum*	Jackson & Willoughby (*in* Sjöstedt 1910)—probably extinct
Button Quail *Turnix sylvatica*	Abbott (*in* Oberholser 1905)
Black Crake *Amaurornis flavirostra*	x
Jacana *Actophilornis africanus*	x
Blacksmith Plover *Vanellus armatus*	x
Common Sandpiper *Actitis hypoleucos*	x
Black-winged Stilt *Himantopus himantopus*	x
Namaqua Dove *Oena capensis*	x
Ring-necked Dove *Streptopelia capicola*	x
Emerald-spotted Wood Dove *Turtur chalcospilos*	x
Black and White Cuckoo *Oxylophus jacobinus*	Neumann & Jackson (*in* Sjöstedt 1910)
Gabon Nightjar *Caprimulgus fossii*	Abbott (*in* Oberholser 1905)
Horus Swift *Apus horus*	Abbott (*in* Oberholser 1905)
Speckled Mousebird *Colius striatus*	x
Blue-naped Mousebird *Urocolius macrourus*	x
Malachite Kingfisher *Alcedo cristata*	x
Striped Kingfisher *Halcyon chelicuti*	x
Chestnut-bellied Kingfisher *H. leucocephala*	x
Little Bee-eater *Merops pusillus*	x
Lilac-breasted Roller *Coracias caudata*	x
Ground Hornbill *Bucorvus cafer*	x
Spotted-flanked Barbet *Tricholaema lacrymosa*	x
White-headed Barbet *Lybius leucocephalus*	x
Brown-breasted Barbet *L. melanopterus*	x
d'Arnaud's Barbet *Trachyphonus darnaudii*	Neumann (*in* Sjöstedt 1910)
Black-throated Honeyguide *Indicator indicator*	x
Cardinal Woodpecker *Dendropicos fuscescens*	x
Red-capped Lark *Calandrella cinerea*	x
Fischer's Sparrow Lark *Eremopterix leucopareia*	x
Pink-breasted Lark *Mirafra poecilosterna*	*in* Britton (1980)
Flappet Lark *M. rufocinnamomea*	Schillings (*in* Sjöstedt 1910)
Striped Swallow *Hirundo abyssinica*	x
Eurasian Swallow *H. rustica*	Abbott (*in* Oberholser 1905)
Wire-tailed Swallow *H. smithii*	x

Species	Recorded in this survey, past records of bird collectors and other notes
Banded Martin *Riparia cincta*	x
African Sand Martin *R. paludicola*	x
Drongo *Dicrurus adsimilis*	x
White-necked Raven *Corvus albicollis*	Abbott (*in* Oberholser 1905)
Pied Crow *C. albus*	x
Grey Tit *Parus afer*	x
Rufous Chatterer *Turdoides rubiginosus*	x
Black Cuckoo Shrike *Campephaga flava*	Neumann (*in* Sjöstedt 1910)
Common Bulbul *Pycnonotus barbatus*	x
Spotted Morning Thrush *Cichladusa guttata*	x
Yellow-breasted Apalis *Apalis flavida*	Abbott (*in* Oberholser 1905)
Rattling Cisticola *Cisticola chiniana*	Abbott (*in* Oberholser 1905)
Winding Cisticola *C. galactotes*	x
Tawny-flanked Prinia *Prinia subflava*	x
Red-faced Crombec *Sylvietta whytii*	x
Chin-spot Batis *Batis molitor*	x
African Pied Wagtail *Motacilla aguimp*	x
Slate-coloured Boubou *Laniarius funebris*	Neumann (*in* Sjöstedt 1910)
White-crowned Shrike *Eurocephalus rueppelli*	x
Retz's Helmet Shrike *Prionops retzii*	Abbott (*in* Oberholser 1905)
Fire-fronted Bishop *Euplectes diadematus*	in Britton (1980)
Taveta Golden Weaver *Ploceus castaneiceps*	x
Masked Weaver *P. intermedius*	x (breeding colony with chicks outside forest, August 1994)
Grey-headed Sparrow *Passer griseus*	x
Waxbill *Estrilda astrild*	x
Cut-throat *Amadina fasciata*	x
Black and White Mannikin *Lonchura bicolor*	x ssp. *nigriceps*
Bronze Mannikin *L. cucullata*	x

In addition, people living around the forest are cutting down large, old trees for timber and building poles. Building poles are obtained from larger trees by splitting the trunks into sections with a wooden wedge and axe. Charcoal production does occur as well, but apparently to a lesser extent. Because of these activities, the forest is of a rather degraded nature. Although these activities were commonly noted in 1993, Kahe forest rangers stated that they have been trying to reduce the level of destruction to the forest reserves (J. S. Msangi, pers. comm. 1994).

The importance of Kahe II FR has been highlighted by the discoveries outlined above. Kahe I FR, however, is the larger of the two reserves and is in need of a biological and conservation investigation. Further efforts through long-term studies should be made to survey the biodiversity and conservation priorities for these two forest reserves.

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Corrigenda

In N. J. Cordeiro's paper "Forest birds on Mt Kilimanjaro, Tanzania", *Scopus* 17, the following errata occurred: p. 74, scientific name of Green Tinkerbird should be *Pogoniulus simplex*. On p. 91, first sentence under **Sylviidae** should read: Bar-throated Apalis *Apalis thoracica* and Black-headed Apalis *A. melanocephala* separate vertically: *A. melanocephala* occupied the mid-stratum to canopy level and *A. thoracica* the understorey.

Scopus 19: 9–26, June 1995

An investigation of the forest avifauna in the North Pare Mountains, Tanzania

Norbert J. Cordeiro and Jacob Kiure

Forest birds were surveyed in four forests in the North Pare Mountains, Tanzania, from July to August 1993 and in July 1994. The main aims of this study were to locate globally threatened species and East Coast Escarpment endemics; compile species lists for each forest; assess the threats to the avifauna and forests and provide a preliminary conservation plan.

The results of prime importance include the discovery of the near-threatened Abbott's Starling *Cinnyricinclus femoralis* and several new range and altitude records, all of which are discussed later. A total of 45 592 net-metre-hours was spent surveying ten sites in the four forests: 559 individual birds comprising 30 species were ringed. A species list is included and behavioural notes on several species provided. In conclusion, a preliminary conservation plan and recommendations for further research are discussed.

Background

There is a limited amount of information available on the avifauna of the North Pares, in particular the forest species (Stuart *et al.* 1993), compared to, for example, those of Mt Kilimanjaro (reviewed in Cordeiro 1994) or the Usambaras (reviewed in Evans & Anderson 1992). Knowledge on the distribution of forest birds in this mountain range is mainly based on the brief visits by collectors employed by R. E. Moreau, by N. R. Fuggles-Couchman and T. Anderson. Moreau's collectors obtained birds from the North Pares in the 1930s (Moreau & Moreau 1937, Moreau 1940), followed by Fuggles-Couchman in June 1942 and October 1952 (Fuggles-Couchman 1984) and, finally Anderson between about 1957 and 1960 (Britton 1978, 1981).

Although specimen labels have not been examined, it seems that most of their collecting took place in the foothills except for known excursions to Kindoroko Forest Reserve, at the southern end of the range. In August 1984, K. M. Howell and C. A. Msuya made brief visits to Kilambeni forest and Minja Forest Reserve (FR) where they recorded several birds (Howell *in litt.*: see Table 3 and Appendix 1). More recently, between 21–24 October 1992, J. Fjeldså and J. Rabøl ringed and observed birds mainly in the lower parts of Kindoroko Forest Reserve (Fjeldså *in litt.*, Fjeldså & Rabøl in press). Other forests, such as the two patches at Kamwala, Mramba FR and Kiverenge FR did not appear to have been ornithologically surveyed and, including the under-studied Kindoroko and Minja FRs, therefore qualified as sites that needed to be investigated (Fig. 1). Kilambeni Forest and Kiverenge FR are the only sites that were not visited by us.

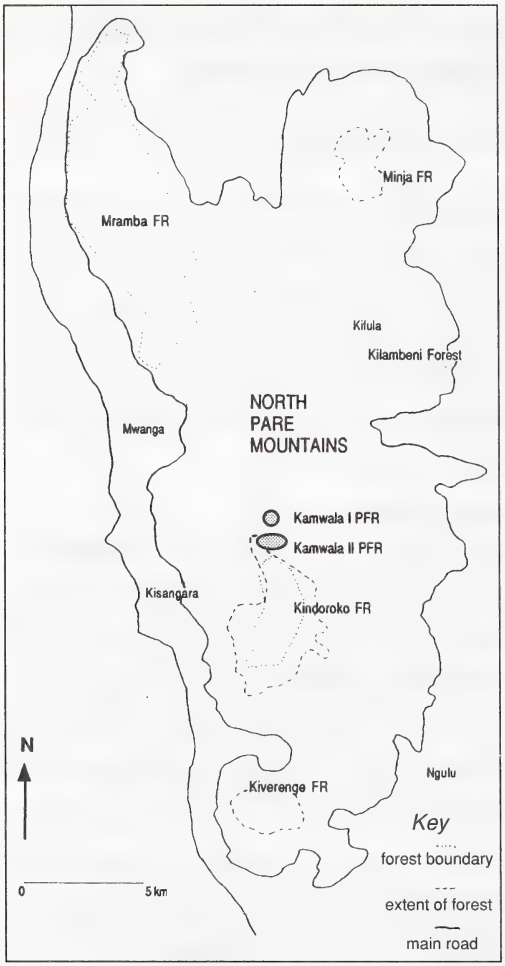

Figure 1. *Forest reserves and proposed forest reserves in the North Pare Mountains, Tanzania*

Study areas

The North Pare Mountains are situated in Mwanga District, Kilimanjaro Region. At present, several forest patches of varying sizes exist mainly at higher altitudes where they are relatively inaccessible due to the steep terrain. It is believed that forest cover was much more extensive in the past and has probably been severely altered over the last 2000 yr by the activities of agricultural societies (Schmidt 1989).

Apart from many small and scattered pockets of forest, including a large but degraded forest at Kilambeni (Howell *in litt.*), there are four forest reserves and two proposed forest reserves (PFR) in the North Pares (Figs. 1 and 2). Minja FR is in the north with an area of 520 ha and extends from 1500–1800 m. [N.B. Minja FR is wrongly denoted in the floodplains north of the North Pares in the recent topographic map (United Republic of Tanzania 1989).] Mramba FR, although the largest at 3355 ha, only has a small patch of forest within the reserve from about 1500–1700 m (Figs. 1 and 2). Kamwala II PFR is 293 ha and Kindoroko FR comprises an area of 885 ha and ranges from about 1400–2100 m. Two additional sites remain unvisited: Kamwala I PFR (117 ha) is north of Kamwala II PFR and in the southern extreme of the North Pares lies Kiverenge FR (area not obtained) (Figs. 1 and 2).

All sites are surrounded by cultivation, dry scrubby vegetation or an *Euphorbia-Acacia* tree-bush-grassland mosaic in the lowlands. Dense clusters of villages dominate the south of Minja FR and encircle much of Kindoroko FR and Kamwala I and II PFRs. In contrast, Mramba FR and Kiverenge FR are bordered by fewer

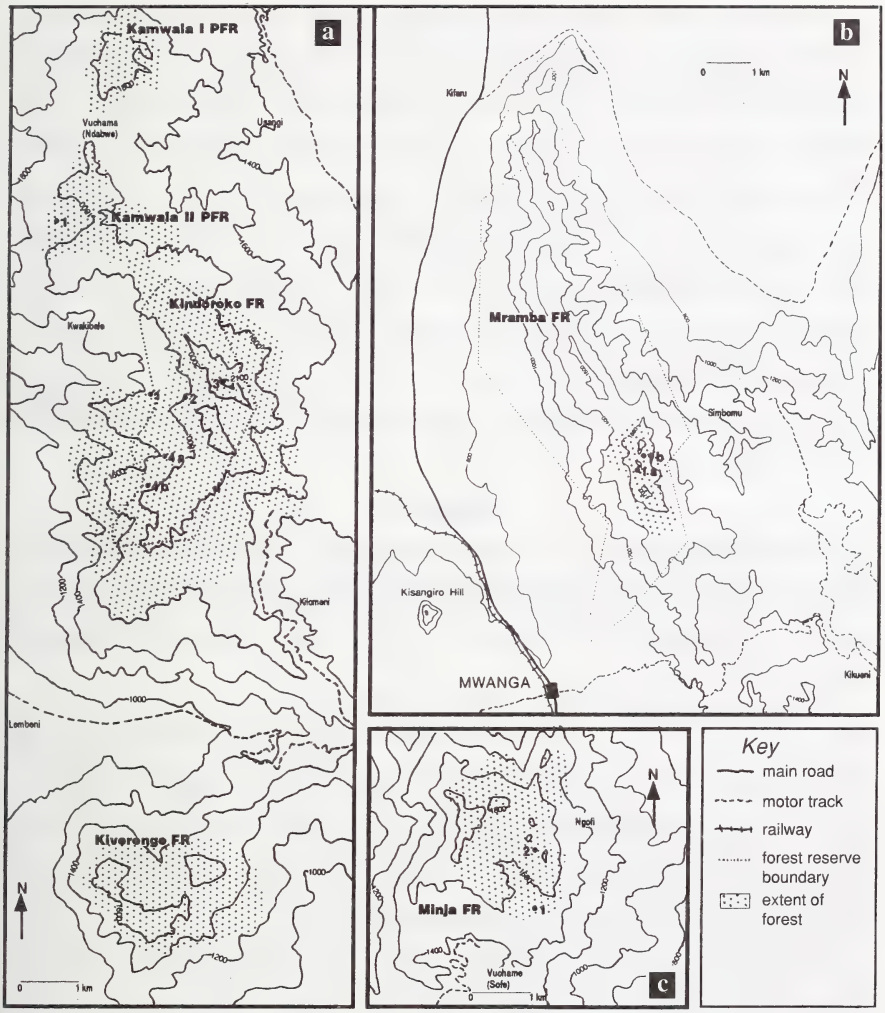

Figure 2. *Location of forest reserves and proposed forest reserves in the North Pares (after United Republic of Tanzania 1989, Sandy 1990). All ringing sites (also see Table 1) are indicated on this map; a: Kindoroko FR and Kamwala II PFR; b: Mramba FR; c: Minja FR. Forest cover for Kamwala I and II PFRs, as denoted on this map, is not accurate but is indicated to show their proposed boundaries*

villages. Many villages in this region have preserved small groves of forests (*jadi*) which are traditionally sacred and are the grave sites of the ancestors. These forests were not allowed to be cut down in the past but this has since changed: some degree of pole wood cutting and firewood collecting by those who do not fear to enter these sacred groves is now quite a common sight.

The vegetation at all four sites was mainly submontane forest except at higher altitudes in both Minja and Kindoroko FRs which were wetter and more montane in character; Mramba FR is a rather dry forest. At lower altitudes on all four sites, *Newtonia buchananii* and *Ficus* and *Albizia* trees predominated, with a dense rubiaceous understorey. In some areas, *Piper capense* also dominated the undergrowth. *Dracaena* sp. was abundant above 1750 m, particularly in Minja and Kindoroko FRs. Epiphytes, lichens and mosses were common above 1750 m at all four sites, but especially so at Minja and Kindoroko FRs. In general, the canopy height below 1900 m ranged from 20–30 m with occasional emergents (35–40 m) and at higher altitudes the canopy ranged from 10–20 m. In addition, there were several pockets of *Philippia excelsa* growing at varying altitudes on Kindoroko FR, Kamwala II PFR and Minja FR. It must be noted that *Podocarpus* sp grew in stunted form in small pockets on Kindoroko FR whereas it was a dominant species in a peculiar dry forest type that occurred below the *Newtonia–Albizia–Ficus* forest (east scarp) at Mramba FR.

Methods

The main objective of this survey was to locate Red Data Book bird species. In addition, species lists were to be compiled for each forest and notes taken on the threats to these sites. The information obtained would provide some indication of the conservation importance of each forest as well as enable comparisons with other Eastern Arc forests.

Three forest reserves (Kindoroko, Minja and Mramba) were investigated from 8 July to 18 August 1993. Kamwala II PFR was surveyed from 28–30 July 1994 (see Table 1). Both authors surveyed all sites except Kindoroko FR which was visited by NJC only. Birds were recorded at various altitudes (using a YCM altimeter) and habitats in these forests through audio-visual observations and mist-netting. These methods were used in combination to record as many species as possible: audio-visual observations provided sufficient coverage of different habitats whereas mist-netting efforts enabled the capture of elusive understorey species.

Between 15 to 19 mist nets were used to capture birds in all four forests. These nets were six to 24 m long and 2.5 to 3 m high. Nets were operated from dawn to dusk and, depending on capture rates, checked at half-hour to hour intervals. All birds were ringed and measured: the original data sheets are deposited with the Tanzania Bird Atlas Project. The following information on each site in the four forests is summarized in Table 1: amount of time spent mist-netting at each site; altitude of each site; duration of the avifaunal survey. Audio-visual observations were conducted when we alternated between netting and bird-watching every two to four hours.

Nomenclature and systematics in the text and tables follows Britton (1980) and Turner *et al.* (1991).

Table 1. *Duration of visits, survey efforts and altitudes of sites at all four forests*

Forest Reserve	Duration of visit	Site	Altitude (m)	Amount of time mist-netting (net-metre-hours)
Kindoroko	8–22 July 1993			
		1	1600	5590
		2	1800	3445
		3	2100	5265
		4a	1700	3835
		4b	1750	1150.5
				subtotal 19285.5
Minja	26 July–2 August 1993			
		1	1500	8405
		2	1700	5649.5
				subtotal 14054.5
Mramba	2–6 August 1993			
		1a	1700	5739
		1b	1650	2010
				subtotal 7749
Kamwala II	28–30 July 1994	1	1700	4503
				subtotal 4503
				Total 45592

Results

Species list

A total of 119 species, including three of uncertain identity, were recorded during our surveys. All bird species that were recorded in the North Pares are presented in Table 2 with information on the habitat in which each species was encountered and their respective altitude ranges. It is clear from this list that forest birds were the primary focus and non-forest species included herein were noted opportunistically whilst moving through other habitats in order to reach the forest sites. Table 2 is by no means a complete check-list for the North Pare forest avifauna as some species may have escaped detection due to the short study period, elusive behaviour or possible seasonal migration to lower altitudes at this time of year—the cold season. Proof of this are the four species recorded at Kindoroko and Minja FRs by other observers and not us (see Table 2). A further 47 species recorded by other observers from the "North Pares" are presented in Table 3; most of these are non-forest dwellers. In addition, Appendix 1 includes a list of 24 species (four uncertain) recorded in Kilambeni Forest (see Fig. 1) by K. M. Howell and C. A. Msuya in 1984.

Table 2. *Systematic list of all species recorded in the North Pares during this study, with four exceptions. Information is provided on forest sites (K = Kamwala II PFR; Ki = Kindoroko FR; M = Minja FR; Mr = Mramba FR), habitats (f = forest; fe = forest edge; fg = forest glade; nf = non-forest habitats which includes scrub, cultivation and woodland) and altitude range. The altitudes are based on observations during this study only and therefore reflect the areas that were visited and not the North Pares as a whole. Square brackets indicate that species identification was not certain. Three species not recorded by us in Minja FR but observed there by K.M. Howell and C.A. Msuya (Howell* in litt.*) on 23 August 1984 are denoted by an asterisk (*). One species not recorded by us but noted at Kindoroko FR in October 1992 by J. Fjeldså and J. Rabøl (Fjeldså* in litt.*) is denoted with a dot (•)*

Family/species	Ki	M	Mr	K	Altitude range (m)
Scopidae					
Hamerkop *Scopus umbretta*		nf			below 1400
Accipitridae					
Palm-nut Vulture *Gypohierax angolensis*		nf			1500
African Goshawk *Accipiter tachiro*	f	f	f	f	900–1200
Augur Buzzard *Buteo augur*	nf	nf	nf	nf	below 2100
Crowned Eagle *Stephanoaetus coronatus*	f	f	f	f	1500–2100
Little Sparrowhawk *Accipiter minullus*		nf			1600
Mountain Buzzard *Buteo oreophilus*	f		f	f	1500–2100
Verreaux's Eagle *Aquila verreauxii*	nf				2100
Wahlberg's Eagle *A. wahlbergi*	nf				2100
Pale Chanting Goshawk *Melierax poliopterus*	nf				below 2100
African Harrier Hawk *Polyboroides typus*	f	nf			below 1700
African Hawk Eagle *Hieraaetus spilogaster*			f		below 1700
Columbidae					
African Green Pigeon *Treron calva*	fe	fe	fe	fe	below 1600
Lemon Dove *Aplopelia larvata*	f	f	f	f	1500–1900
Olive Pigeon *Columba arquatrix*	f	f	nf		(1200) 1500–1800
Emerald-spotted Wood Dove *Turtur chalcospilos*		nf			below 1300
Tambourine Dove *T. tympanistria*	f	f	f, nf	f	1400–1800
Red-eyed Dove *Streptopelia semitorquata*	nf	nf	nf	nf	below 1500
Ring-necked Dove *S. capicola*			nf		below 1300
Musophagidae					
Hartlaub's Turaco *Tauraco hartlaubi*	f	f	f	f	1400–2100
Cuculidae					
Yellowbill *Ceuthmochares aereus*			nf		1600
White-browed Coucal *Centropus superciliosus*			fg, nf		below 1700
Strigidae					
African Wood Owl *Strix woodfordii*	f	f	f	f	1500–2100
Apodidae					
Little Swift *Apus affinis*			nf		below 2100
[Black Swift *A. barbatus*]	nf				1700–2100
Horus Swift *A. horus*	nf		nf		1700
[Scarce Swift *Schoutedenapus myoptilus*]	nf				2100
Palm Swift *Cypsiurus parvus*			nf		below 1400
Coliidae					
Speckled Mousebird *Colius striatus*			nf		below 1500

Family/species	Ki	M	Mr	K	Altitude range (m)
Blue-naped Mousebird *Urocolius macrourus*		nf	nf		below 1500
Trogonidae					
Bar-tailed Trogon *Apaloderma vittatum*	f	f	f		1700–1800
Alcedinidae					
Brown-hooded Kingfisher *Halcyon albiventris*	nf		nf		below 1500
Striped Kingfisher *H. chelicuti*			nf		below 1500
Meropidae					
Cinnamon-chested Bee-eater *Merops oreobates*	f, fe	f, fe	f, fe	f, fe	1400–1900
Bucerotidae					
Silvery-cheeked Hornbill *Bycanistes brevis*	f	f	f	f	1400–2100
Trumpeter Hornbill *B. bucinator*	f, fe	f, fe	f, fe	f, fe	1200–1600
Crowned Hornbill *Tockus alboterminatus*	fe, nf	fe, nf	fe, nf		below 1500
Grey Hornbill *T. nasutus*			nf		below 1400
Lybiidae					
White-eared Barbet *Stactolaema leucotis*	fe	fe	fe, fg	fe, fg	1400–1750
Spotted-flanked Barbet *Lybius lacrymosus*	nf	nf	nf	nf	below 1500
Brown-breasted Barbet *L. melanopterus*			nf		below 1300
Moustached Green Tinkerbird *Pogoniulus leucomystax*	f	f	f	f	1450–2100
Red-fronted Tinkerbird *P. pusillus*			nf		below 1300
Red and Yellow Barbet *Trachyphonus erythrocephalus*			nf		below 1300
Indicatoridae					
Lesser Honeyguide *Indicator minor*			nf	f	1600–1750
Scaly-throated Honeyguide *I. variegatus*		f			1700
Eastern Honeybird *Prodotiscus zambesiae*	nf, fe				1450–1600
Picidae					
Golden-tailed Woodpecker *Campethera abingoni*				f	1750
Olive Woodpecker *Dendropicos griseocephalus*	f		f	f	1500–1800
Hirundinidae					
Black Rough-wing *Psalidoprocne pristoptera*	f	f	f	f	1200–2100
Mosque Swallow *Hirundo senegalensis*	nf	nf	nf		below 2100
African Rock Martin *H. fuligula*	nf				below 1400
Striped Swallow *H. abyssinica*			nf		below 1400
Dicruridae					
Drongo *Dicrurus adsimilis*			nf	nf	below 1300
Corvidae					
White-necked Raven *Corvus albicollis*	nf	nf	nf	nf	1500–2100
Paridae					
White-breasted Tit *Parus albiventris*	nf	*	nf		below 1500
Timaliidae					
African Hill Babbler *Alcippe abyssinica*	f	f	f	f	1500–2100
Pycnonotidae					
Olive Mountain Greenbul *Phyllastrephus placidus*	f	f	f	f	1500–2100
Stripe-cheeked Greenbul *Andropadus milanjensis*	f	f	f	f	1500–2100
Zanzibar Sombre Greenbul *A. importunus*			fe	fe	1600–1750
Yellow-bellied Greenbul *Chlorocichla flaviventris*		nf			below 1500
Common Bulbul *Pycnonotus barbatus*	nf	nf	nf	nf	below 1500
Turdidae					
Northern Olive Thrush *Turdus abyssinicus*	f	f	f	f	1500–2100
Orange Ground Thrush *T. gurneyi*	f	f	f		1500–2100
Spotted Morning Thrush *Cichladusa guttata*			nf		below 1200
Robin Chat *Cossypha caffra*	fe	*		fe	1500–1750
Rüppell's Robin Chat *C. semirufa*	f	f	f	f	1500–2100
White-starred Forest Robin *Pogonocichla stellata*	f	f	f	f	1500–2100

Family/species	Ki	M	Mr	K	Altitude range (m)
Stonechat *Saxicola torquata*	nf	nf	nf	nf	1400–1800
Sylviidae					
Black-headed Apalis *Apalis melanocephala*	f	f	f	f	1500–2000
Brown Woodland Warbler *Phylloscopus umbrovirens*	f				above 1900
Evergreen Forest Warbler *Bradypterus barratti*	f	f	f	f	1500–2100
Grey-backed Camaroptera *Camaroptera brachyura*	nf, fe	fe	fe, fg	fe	below 1750
Tawny-flanked Prinia *Prinia subflava*	nf		nf		below 1450
Muscicapidae					
Crested Flycatcher *Trochocercus cyanomelas*	f	f	f		1500–1750
Dusky Flycatcher *Muscicapa adusta*	fe	fe, fg	fg	fe, fg	1400–1750
Forest Batis *Batis mixta*	f		f?		1500–1600
Black-throated Wattle-eye *Platysteira peltata*		f		f	1500–1750
Paradise Flycatcher *Terpsiphone viridis*	nf	nf		f	below 1750
Grey Flycatcher *Bradornis microrhynchus*			nf		below 1300
Pale Flycatcher *B. pallidus*		nf (Kikueni)			below 1300
White-eyed Slaty Flycatcher *Melaenornis chocolatina*	fe	fe	fe		1400–1750
Motacillidae					
African Pied Wagtail *Motacilla aguimp*	nf	nf	nf	nf	below 1500
Mountain Wagtail *M. clara*				nf	1400
Striped Pipit *Anthus lineiventris*	nf			nf	1500–1700
Malaconotidae					
Black-backed Puffback *Dryoscopus cubla*	f	f	f	f	1400–1750
Tropical Boubou *Laniarius ferrugineus*	fe	*	fg, fe		1500–1750
Many-coloured Bush Shrike *Malaconotus multicolor*	f	f	f	f	1500–2000
Four-coloured Bush Shrike *M. quadricolor*		fe	fe		1100–1800
Brown-headed Tchagra *Tchagra australis*			nf		below 1500
Black-headed Tchagra *T. senegala*	nf				below 1600
Laniidae					
Fiscal *Lanius collaris*	nf	nf	nf		below 1400
Prionopidae					
Helmet Shrike *Prionops plumata*			nf		below 1300
Sturnidae					
Abbott's Starling *Cinnyricinclus femoralis*	fe, f				1600
Violet-backed Starling *C. leucogaster*	nf		nf		below 1300
Sharpe's Starling *C. sharpii*	fe, f				1600
Red-winged Starling *Onychognathus morio*	nf	nf	nf		below 1500
Waller's Chestnut-winged Starling *O. walleri*				f	1700
Kenrick's Starling *Poeoptera kenricki*	•	f	f		1500–1700
Nectariniidae					
Collared Sunbird *Anthreptes collaris*	fe	fe	fe	fe	below 1500
Eastern Double-collared Sunbird *Nectarinia mediocris*	f	f	f	f	1500–2100
Olive Sunbird *N. olivacea*	f	f	f	f	1500–2100
Amethyst Sunbird *N. amethystina*	nf	nf	nf	nf	below 1500
Variable Sunbird *N. venusta*		nf	nf		below 1400
Zosteropidae					
Montane White-eye *Zosterops poliogastra*	f	f	f	f	1500–2100
Yellow White-eye *Z. senegalensis*	nf		nf		below 1500
Ploceidae					
Baglafecht Weaver *Ploceus baglafecht*	nf	nf	nf	nf	below 1750
Spectacled Weaver *P. ocularis*			nf		below 1700
[African Firefinch Indigobird *Hypochera funerea*]	nf		nf		below 1400
Estrildidae					
Red-faced Crimson-wing *Cryptospiza reichenovii*	f	f	f	f	1500–1900

Family/species	Ki	M	Mr	K	Altitude range (m)
Peters' Twinspot *Hypargos niveoguttatus*	fe			fe	1700
Red-billed Firefinch *Lagonosticta senegala*	nf		nf		below 1600
Green-backed Twinspot *Mandingoa nitidula*		f, fe		f	1500–1750
Yellow-bellied Waxbill *Estrilda melanotis*	fe			fe	1400–1600
Waxbill *E. astrild*	nf	nf	nf		below 1600
Red-cheeked Cordon-bleu *Uraeginthus bengalus*			nf		below 1400
Black and White Mannikin *Lonchura bicolor*	fe	fe	fe, fg	fe, fg	below 1750
FRINGILLIDAE					
Thick-billed Seed-eater *Serinus burtoni*				f	1750
African Citril *Serinus citrinelloides*	nf	nf	nf	nf	1400–1800

Table 3. *List of additional bird species noted from the North Pare area by other observers. Note that three species that were not recorded by us at Kindoroko FR are denoted with an asterisk (*). Unless stated otherwise, most locations are indicated in Figures 1 and 2*

Species	Location, altitude, date and source
Ovampo Sparrowhawk *Accipiter ovampensis*	Lembeni, Aug 1959 (Anderson *in* Britton 1981)
Lizard Buzzard *Kaupifalco monogrammicus*	Kifula, Aug 1984 (K. M. Howell and C. A. Msuya *in litt.*)
Gabar Goshawk *Micronisus gabar**	Kindoroko FR, October 1992 (J. Fjeldså *in litt.*)
Pygmy Falcon *Polihierax semitorquatus*	Ngulu (Fuggles-Couchman 1984)
Shelley's Francolin *Francolinus shelleyi*	May 1958 (Anderson *in* Britton 1978)
Lesser Moorhen *Gallinula angulata*	seasonal pool, Lembeni (Fuggles-Couchman 1984)
Little Ringed Plover *Charadrius dubius*	Nov 1957 (Anderson *in* Britton 1978)
Two-banded Courser *Rhinoptilus africanus*	Kileo (3º29N, 37º37E), June 1942 (Fuggles-Couchman 1984)
Emerald Cuckoo *Chrysococcyx cupreus*	Lembeni, April 1960; Kisangara March 1959 (Fuggles-Couchman 1984)
Levaillant's Cuckoo *Oxylophus levaillantii*	Jan/Feb (Anderson *in* Britton 1981)
Eurasian Scops Owl *Otus scops*	ssp. *scops*, 2000 m, Nov 1958 (Britton 1980)
Eurasian Swift *Apus apus*	Jan 1960, 800 m ((Anderson *in* Britton 1981)
Alpine Swift *A. melba*	Kisangara, 500 m, Oct 1952 (Fuggles-Couchman 1984)
Narina's Trogon *Apaloderma narina*	1800–2000 m (Anderson *in* Britton 1981)
Chestnut-bellied Kingfisher *Halcyon leucocephala*	"Pare Mts" (Britton 1980)
Pygmy Kingfisher *Ispidina picta*	900–1400 m (Anderson *in* Britton 1981)
Green Wood Hoopoe *Phoeniculus purpureus*	dry east slope, below Kifula, Aug 1984 (K. M. Howell and C. A. Msuya *in litt.*)
Abyssinian Scimitarbill *Rhinopomastus minor*	Kifula, Aug 1984 (K. M. Howell and C. A. Msuya *in litt.*)
Ground Hornbill *Bucorvus cafer*	near Kikueni, Aug 1984 (K. M. Howell and C. A. Msuya *in litt.*)
Pallid Honeyguide *Indicator meliphilus*	(Britton 1980)

Species	Location, altitude, date and source
Wahlberg's Honeybird *Prodotiscus regulus*	west slope, 1500 m, June 1961 (Anderson *in* Britton 1981)
Bennett's Woodpecker *Campethera bennettii*	woodland (Britton 1980)
African Pitta *Pitta angolensis*	Lembeni, April 1960 (Anderson *in* Britton 1978)
Fawn-coloured Lark *Mirafra africanoides*	foothills (Britton 1980)
Red-rumped Swallow *Hirundo daurica*	highland areas (Britton 1980)
Black-headed Oriole *Oriolus larvatus*	Kifula, Aug 1984 (K. M. Howell and C. A. Msuya *in litt.*)
Mouse-coloured Penduline Tit *Remiz musculus*	foothills up to 900 m (Britton 1980)
Scaly Chatterer *Turdoides aylmeri*	foothills (Britton 1980)
Black Cuckoo Shrike *Campephaga flava*	Kifula, Aug 1984 (K. M. Howell and C. A. Msuya *in litt.*)
Nicator *Nicator chloris*	1700 m (Anderson *in* Britton 1981)
White-chested Alethe *Alethe fuelleborni**	Kindoroko FR, December 1991 (N. E. and E. M. Baker, pers. comm.)
Eastern Bearded Scrub Robin *Cercotrichas quadrivirgata*	up to 1800 m (Britton 1980)
Cinnamon Bracken Warbler *Bradypterus cinnamomeus**	Kindoroko FR, October 1992 (J. Fjeldså *in litt.*)
Ashy Cisticola *Cisticola cinereola*	northern foothills (Fuggles-Couchman 1984)
Tiny Cisticola *C. nana*	foothills (Britton 1980)
Long-billed Pipit *Anthus similis*	(Britton 1980)
Pangani Longclaw *Macronyx aurantiigula*	Ngulu (Fuggles-Couchman 1984)
Grey Wagtail *Motacilla cinerea*	winter visitor (Britton 1980)
Chestnut-fronted Helmet Shrike *Prionops scopifrons*	dry east slope, near Ubembe, Aug 1984 (K. M. Howell and C. A. Msuya *in litt.*)
Magpie Starling *Speculipastor bicolor*	west side at 900 m, Jan 1957 (Anderson *in* Britton 1981)
Little Purple-banded Sunbird *Nectarinia bifasciata*	Britton (1980)
Hunter's Sunbird *N. hunteri*	dry east slope, between Kifula and Ubembe, Aug 1984 (K. M. Howell and C. A. Msuya *in litt.*)
Scarlet-tufted Malachite Sunbird *N. johnstoni*	probable wanderer at north end, 1800 m (Moreau 1940)
Golden-winged Sunbird *N. reichenowi*	Britton (1980)
Grosbeak Weaver *Amblyospiza albifrons*	Kifula, Aug 1984 (K.M. Howell and C.A. Msuya *in litt.*)
Grey-headed Silver-bill *Lonchura griseicapilla*	(Anderson *in* Britton 1978)

Mist-netting

We spent a total of 45 592 net-metre-hours surveying ten sites in the four North Pare forests (Table 4; Fig. 2). We ringed 559 individuals comprising 30 species (Table 4). The most abundant species netted at all four sites were Olive Mountain Greenbul, Olive Sunbird and White-starred Forest Robin. The Stripe-cheeked Greenbul and Red-faced Crimsonwing were also commonly trapped (see Table 4).

Table 4. *List of birds netted and ringed in four North Pare forests (scientific names are given in Table 2)*

	Mramba	Kindoroko				Minja		Kamwala
	1	1	2	3	4	1	2	1
Species								
African Goshawk		1		1			1	
Lemon Dove	1	1						
Tambourine Dove	1							
African Wood Owl			1					
Moustached Green Tinkerbird	1							
Olive Woodpecker								1
African Hill Babbler		2		1		3		1
Olive Mountain Greenbul	23	16	8	8	13	15	9	17
Stripe–cheeked Greenbul	5	10		1	3	17	4	13
Zanzibar Sombre Greenbul	1							1
Northern Olive Thrush		1	3	1	2	5	2	3
Orange Ground Thrush	1	1		2	(1)*	4	3	
Robin Chat					1			
Rüppell's Robin Chat	12	2		1	4	3	2	4
White-starred Forest Robin	11	7	3	3	10	30	13	3
Brown Woodland Warbler				3				
Evergreen Forest Warbler	2			3		1	1	1
Grey-backed Camaroptera	1							
Crested Flycatcher	3	1				9	1	
Dusky Flycatcher								1
Black-throated Wattle-eye						3		1
Paradise Flycatcher								2
Tropical Boubou	1							
Many-coloured Bush Shrike		1						
Collared Sunbird						2		2
Eastern Double-collared Sunbird		1	1	2				1
Olive Sunbird	1	35	8	1	14	40	11	24
Montane White-eye		2		2		7		
Red-faced Crimsonwing	9	7	2		2	17	2	4
Green-backed Twinspot						7		2
Total	74	88	27	29	49(50)	163	49	81

Note: * = killed by African Wood Owl in net

Breeding records

During our survey of the four forests, we opportunistically recorded the breeding activities of 23 bird species for which we have a total of 91 records, two of which were suspected breeding records. Observations were made of active nests containing fledglings or eggs, dependent juveniles being fed by a parent, birds collecting nesting materials and birds with fresh brood patches. The last indicator is reliable (e.g., Tye 1992) and we have avoided including misleading information by selecting only those individuals which showed fresh brood patches (score *4* or *5*). Table 5 presents this information by site, habitat, altitude range of records and month of breeding activity.

Table 5. *Breeding records of 23 species in the North Pare Mountains. Breeding records (b = fresh brood patch of scores 4 and 5; d = dependent juvenile; n = active nest with young or eggs; s = suspected breeding based on nest-building activities), sites (K = Kamwala II PFR; Ki = Kindoroko FR; M = Minja FR; Mr = Mramba FR), habitat (f = forest; fe = forest edge), altitude of observation and month of activity are given*

Species	Breeding records	Site/ habitat	Altitude (m) and number of records (in parentheses)	Month
African Goshawk	n	Ki/f	1600 (1)	Jul
Augur Buzzard	n	Ki/fe	1600 (1)	Jul
Hartlaub's Turaco	s	Ki/fe	1600 (1)	Jul
Moustached Green Tinkerbird	b	Mr/f	1650 (1)	Aug
African Hill Babbler	b	M/f	1500 (1)	Jul
Olive Mountain Greenbul	b	K, Ki, M, Mr/f	1500 (3), 1700 (14), 1800 (2)	Jul, Aug
Stripe-cheeked Greenbul	b, d	K, M, Mr/f	1500 (1), 1700 (5)	Jul, Aug
Northern Olive Thrush	b	M/f	1500 (1)	Jul
Orange Ground Thrush	b	Ki, M/f	1500 (2), 1700 (1), 2100 (1)	Jul
Rüppell's Robin Chat	b	Mr/f	1700 (4)	Aug
White-starred Forest Robin	b	Mr/f	1700 (1)	Aug
Crested Flycatcher	b	M, Mr/f	1500 (4), 1700 (3)	Jul, Aug
Dusky Flycatcher	f	Ki/fe	1600 (1)	Jul
Tropical Boubou	b	Mr/f	1700 (1)	Aug
Collared Sunbird	b	M/f	1500 (1)	Jul
Olive Sunbird	b	K, M/f	1500 (12), 1700 (7)	Jul
Montane White-eye	b	K, M/f	1500 (6), 1600 (1)	Jul
Red-faced Crimsonwing	b	K, Ki, M, Mr/f	1500 (2), 1600 (1), 1700 (5)	Jul
Green-backed Twinspot	b	M/f	1500 (3)	Jul
Waxbill	n	Ki/fe	1600 (1)	Jul
Black and White Mannikin	s	K/fe	1700 (1)	Jul
Thick-billed Seedeater	d	K/f	1700 (1)	Jul
African Citril	d	K/fe	1750 (1)	Jul

Notes on selected species

This section is divided into four parts which deal with Red Data Book birds, new range extensions, new altitude records and interesting behavioural notes regarding feeding and hunting.

Red Data Book species

Four species of "near-threatened" and "candidate threatened" status (Collar & Stuart 1985) which were recorded in the North Pares are discussed.

Abbott's Starling *Cinnyricinclus femoralis*—near-threatened

This species is only known from a few montane forests in Kenya and Tanzania. It was previously known to occur in the Kikuyu Escarpment and Mts Kenya, Kilimanjaro and Meru (Collar & Stuart 1985, Collar *et al.* 1994). It was discovered at Kindoroko FR in the North Pare Mountains during this study. Flocks of 20–25 adults and immatures

were seen in the evenings as they came to roost in the canopy (1600 m). They appeared to be followed by smaller flocks of Sharpe's Starlings and it is possible that some flocks were mixed. These species are considered to be allopatric (Britton 1980); however, recent evidence suggests that this may not be true at all sites (Britton 1980, Taylor & Taylor 1988, Cordeiro 1994). The presence of this species in the North Pares may be seasonal and further work during other months is required to establish its status there.

White-chested Alethe ***Alethe fuelleborni***—candidate-threatened
Previously unknown from this mountain range, this species was heard at Kindoroko FR in December 1991 (N. E. and E. M. Baker, pers. comm.). Efforts to locate this understorey dweller in July 1993 proved fruitless and it is possible that it is scarce and very locally distributed in this reserve.

Kenrick's Starling ***Poeoptera kenricki***—candidate-threatened
This species was not recorded by us at Kindoroko FR and Kamwala II PFR but may have been overlooked because of its wandering habits. This is further emphasized by observations of it at Kindoroko FR by J. Fjeldså and J. Rabøl (see Table 3). However, a few very small flocks (< 5 per flock) were seen at Minja FR and larger flocks (10–15) were regularly encountered at Mramba FR where they foraged on figs.

Chestnut-fronted Helmet Shrike ***Prionops scopifrons***—candidate-threatened
Britton (1980) does not include the North Pares as a locality for this local species; however, K. M. Howell and C. A. Msuya noted ten individuals below the eastern scarp, between Kifula and Ubembe in August 1984 (K. M. Howell *in litt.*).

New range extensions and notes on little-known species in the North Pares

Several species were recorded that are not mentioned from the North Pares by Britton (1980). Many of these may have been overlooked because of their elusive behaviour or migratory habits. These are: Yellowbill, Horus Swift, [Scarce Swift], Zanzibar Sombre Greenbul, Forest Batis and Green-backed Twinspot. The omissions of two conspicuous species—Mountain Buzzard and Cinnamon-chested Bee-eater—from Britton (1980) is strange since they occur commonly at most forested sites in the North Pares. Dowsett & Dowsett-Lemaire (1979) and Turner (1980) also do not mention the North Pares as a location for the buzzard.

Another two species—Thick-billed Seedeater and Waller's Chestnut-winged Starling—were recorded in the North Pares (Moreau 1940, Britton 1981) but no mention was made of the exact locations. The seed-eater, which can be easily overlooked as it often haunts the canopy, was recorded at Kamwala II PFR; it may also occur at other sites. The starling, known from the South Pares as well (Fuggles-Couchman 1984), was collected by T. Anderson at 1600 m in the North Pares (Britton 1981): a pair was recorded at Kamwala II PFR and it may therefore be a scarce species in this range.

New altitude records

The Stripe-cheeked Greenbul and Four-coloured Bush Shrike were located above the altitudes given in Britton (1980). The greenbul was common up to 2100 m, an observation which corresponds with others made on Mt Kilimanjaro (Cordeiro 1994). The bush shrike, which mainly occurs below 600 m, is also known from 900 m and 1200 m at Ngulia and Endau, Kenya respectively (Britton 1980). T. Anderson collected it at 2000 m in the North Pares; the precise locality is unknown (Britton 1981). Although not recorded at Kindoroko FR, this species was noted from forest and dense thickets at Minja FR (1500–1800 m) and Mramba FR (1700 m). A male was also seen in short and dense dry scrub/thickets along the escarpment near Kikueni (1200 m).

Behavioural notes

African Goshawk *Accipiter tachiro*

This raptor was the first species to call in the early mornings at about 05:00–05:30. Three attacks on birds by this species were observed. The first occurred at about 07:30 on 31 July 1993 at Minja FR where an immature goshawk attacked a Stripe-cheeked Greenbul caught in a mist net. It missed due to the presence of NJC and was caught in the net. On 1 August the same individual had perched in the canopy about 50 m away from a mixed feeding flock. At 14:12 it swooped into the flock and captured one unidentified bird from the canopy. Another attack was observed on 3 August at Mramba FR: an adult had been watching a pair of Lemon Doves foraging on the ground near a net. When NJC approached and disturbed the doves, both flew into the net. Within one to two seconds, the raptor dived from the canopy and seized one dove, later releasing it as NJC ran to remove the netted doves.

African Harrier Hawk *Polyborides typus*

This bird was observed foraging in an old emergent *Newtonia buchananii* tree at 1700 m. Although typically a woodland species, it has been recorded inside forest in the Usambaras (Stuart 1989).

Olive Pigeon *Columba arquatrix*

A flock of about ten were observed feeding on fruits in dry woodland near the village of Simbomu. This is an unusual record as this pigeon is a forest species (Britton 1980) and the nearest forest in this case was at least 2 km away.

African Wood Owl *Strix woodfordii*

An Orange Ground Thrush was killed in the net by this owl between 17:00–17:30 on 17 July in Kindoroko FR. This behaviour was repeated at Kamwala II PFR on 29 July at about 17:30–18:00 where a Northern Olive Thrush was killed by the same species.

Orange Ground Thrush *Turdus gurneyi*

At 18:00 on 28 July 1993 at 1500 m in Minja FR, an Orange Ground Thrush was netted, ringed and released. This individual was later retrapped at 1700 m at 12:30 on 30 July. This capture is of interest as it represents an upward vertical shift of 200 m in

less than two days during the cold-season; an observation that we have not come across elsewhere in the literature.

White-eyed Slaty Flycatcher *Melaenornis chocolatinia*
Mackworth-Praed & Grant (1960) mention that this species takes berries on occasion. One observation was made at Kindoroko FR of this species feeding on the ripe dark purple berries of a rubiaceous shrub.

Discussion

Preliminary comparison with other Eastern Arc forests

Given the short study period and the incomplete knowledge of the forest avifauna in the North Pares, it is difficult to make a detailed comparison with other Eastern Arc forests here. In brief, some birds are common to the Usambaras and North Pares but absent from nearby Mt Kilimanjaro, e.g. Orange Ground Thrush and White-chested Alethe. Several species occurring on Kilimanjaro are also subspecifically distinct from those found in the North Pares and Usambaras, e.g. Tropical Boubou and White-starred Forest Robin. This shows that the North Pares share some affinity with the Eastern Arc biota; however, there are several species that the North Pares share in common with Kilimanjaro which are apparently absent from the Usambaras, e.g. Brown Woodland Warbler, Abbott's Starling and Thick-billed Seed-eater. In addition, compared to the Usambaras, turdines and greenbuls are poorly represented in the North Pares. It appears, therefore, that the forest avifauna of the North Pares is intermediate between that of the volcanic mountains such as Kilimanjaro and that of the Eastern Arc mountains; but, as Fjeldså & Rabøl (in press) contend, there is also some degree of affinity with the avifauna of the coastal forest mosaic. Fjeldså & Rabøl (in press) speculate that the ash-fall from Kibo's (Mt Kilimanjaro) last eruption at about 36 000 BP may have caused the extinctions of much of the Eastern Arc biota in the North Pares. Further work in the Pares and other little-explored areas in the region will add to our understanding of the birds of this range.

Conservation recommendations

The forest reserves in the North Pare Mountains, though small, are now known to harbour some globally important birds such as Abbott's Starling and some Eastern Arc endemics and near-endemics. These reserves did not appear to be under any immediate threat; nevertheless, there is some degree of pit-saw logging at all three forest reserves which may prove destructive if a large market for the timber develops in the near future. In addition, farmers are slowly encroaching into the southern section of Minja FR which could prove destructive.

These forests are important catchment areas for the North Pare plateau and surrounding foothills. With further degradation of the remaining forests in the North Pares, this region and the people who inhabit it are sure to face dire consequences similar to those that occurred at Mt Mulange, Malawi, in 1991 where heavy rainfall caused massive mudslides on the deforested slopes of the mountain that overcame several villages (*The Times*, 23 March 1991, *loc. cit.* Evans & Anderson 1992). In

addition, the important biota of these forests would be lost. It is for these reasons that we fully support the establishment of Kamwala I and II PFRs by the Kilimanjaro Catchment Forest Project, initiated by M. I. L. Katigula and currently managed by S. S. Kashenge. Both these forests are being encroached on by farmers and, if the present rate continues, the villagers will face local water shortages for their homes and *shambas*.

The following recommendations are suggested to promote the conservation of, and to enhance our understanding of the forests and their biota in the North Pares (see also a detailed review on forest conservation in Tanzania in Rodgers (1993)):

1. Urgent mapping of all the remaining forests, including the sacred groves (*jadi*), needs to be conducted.
2. All the boundaries need to be clearly marked with tree cordons. Although the boundaries of Minja and Kindoroko FRs were well-marked, those of Mramba FR remained to be completed.
3. Forest rangers should be given incentives for their often dangerous work. Only with these incentives and co-operative officials, will they be able to prevent any further destruction from taking place in the forests.
4. The villagers need to be educated about the importance of these forests and be actively involved with indigenous tree-planting activities in the area. These trees could form a buffer zone around some forest reserves or serve as protection against erosion on the farmed slopes. Some of these trees could be harvested for timber or firewood on a continuous basis.
5. Research must be conducted on the most nutritional fodder for livestock in this range. Kamwala II PFR seemed to be invaded by cattle to the extent that the understorey was quite disturbed. A suitable alternative that could replenish itself quickly on the plateau must be sought to cater for the needs of the farmers and livestock.
6. Long-term research on birds is required for all the forest reserves on this range. This includes the three sites visited as well as Kamwala I PFR and Kiverenge FR. The avifauna is still poorly known and long-term research may add more threatened species and East Coast Escarpment endemics or near-endemics. In addition, ringing studies should be conducted over a long period (up to three years) to determine whether or not certain species move between the forests. Many small forest groves (*jadi*) exist that possibly serve as important "stepping stones" for bird dispersal between larger forest reserves. These patches may also serve as important habitats for species of restricted range not known from the larger reserves and therefore require to be visited.
7. Other animal groups in this range have been little studied. A multi-disciplinary expedition focusing on the fauna and flora of the North Pares would provide useful information for conservation purposes. For example, the restricted Black and Rufous Elephant Shrew *Rhynchocyon petersi* was recorded during our surveys (NJC pers. obs.) providing a new locality record for this species.

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Appendix 1

Birds recorded at Kilambeni Forest—a degraded forest patch at *c.* 1550 m (see Fig. 1) —in August 1984 by K. M. Howell and C. A. Msuya (K. M. Howell *in litt.*)

Crowned Eagle *Stephanoaetus coronatus*
Hildebrandt's Francolin *Francolinus hildebrandti*—woodland/cultivation near forest
Olive Pigeon *Columba arquatrix*
Tambourine Dove *Turtur tympanistria*
Hartlaub's Turaco *Tauraco hartlaubi*
African Wood Owl *Strix woodfordii*
[Narina's Trogon *Apaloderma narina*
Silvery-cheeked Hornbill *Bycanistes brevis*
Trumpeter Hornbill *B. bucinator*
Crowned Hornbill *Tockus alboterminatus*
Tinkerbird species *Pogoniulus* sp.
[Moustached Green Tinkerbird *P. leucomystax*
African Hill Babbler *Alcippe abyssinica*
Olive Mountain Greenbul *Phyllastrephus placidus*
Common Bulbul *Pycnonotus barbatus*
White-starred Forest Robin *Pogonocichla stellata*
Dusky Flycatcher *Muscicapa adusta*
Black-throated Wattle-eye *Platysteira peltata*
Paradise Flycatcher *Terpsiphone viridis*
Black-backed Puffback *Dryoscopus cubla*
Tropical Boubou *Laniarius ferrugineus*
[Many-coloured Bush Shrike *Malaconotus multicolor*
White-eye *Zosterops* sp.
Peters' Twinspot *Hypargos niveoguttatus*

Scopus 19: 27–37, June 1995

Birds of prey and owls of the western and northern slopes of Mt Kilimanjaro, Tanzania

John M. Grimshaw

Records of 49 species of birds of prey noted between Sanya Juu and Rongai on the western and northern slopes of Mt Kilimanjaro, Tanzania, are presented and their distribution on the mountain slopes related to their dietary preferences. New records for Kilimanjaro of Booted Eagle *Hieraaetus pennatus* and Bat Hawk *Macheiramphus alcinus* are reported. The unconfirmed presence of Mackinder's Eagle Owl *Bubo capensis mackinderi* in the alpine zone is discussed.

The birds of Mt Kilimanjaro have been studied for over a century, since H. H. Johnston made the first collection in 1884. A number of other collections were made between then and 1914 which resulted in the publication of several species lists (summarized by Cordeiro 1994). The first ecological studies of Kilimanjaro birds were made by Moreau, who published some valuable papers focusing especially on biogeographic aspects of species distributions (Moreau 1936, Moreau & Moreau 1939, Moreau 1944), with a later general Afromontane overview (Moreau 1966). Lamprey (1965) produced an account in popular style of the forest and alpine zone birds. King (1973) also described the altitudinal distribution of birds on the mountain. In recent years N. J. Cordeiro has carried out extensive research on the forest species, which has been the subject of several publications, including the most important summary of Kilimanjaro birds yet (Cordeiro 1994).

This paper is based on personal sightings of birds of prey and owls on the western and northern slopes of Kilimanjaro between 1990 and 1994, supplemented by the observations of several friends and the published literature. The estimations of abundance are subjective and personal; a quantified survey would be a most valuable exercise. My observations have been made while engaged on other activities and do not represent a specific study of the birds of prey.

The area covered lies between the townships of Sanya Juu and Rongai and is largely defined by the road linking them, although the records come from areas both above the road, to 4000 m, and below it, to approximately 1300 m. This broad band encompasses a very great diversity of terrain and habitats.

The lower elevations are characterized by *Acacia* savannah, with occasional rocky outcrops. At altitudes between 1300–1500 m a zone of cultivation begins. On the western slope this is dominated by large colonial-era arable farms, growing large acreages of wheat, barley and beans. Amongst these there are pockets of African smallholdings growing small plots of maize and beans as the principal crops. Within this zone a considerable area remains under semi-natural vegetation in the form of dry bushed grassland on steep hills, contour lines, abandoned fields and so on. I have termed this landscape the 'arable-bush mosaic'. A 7-km stretch of the northern slope is uncultivated and here natural vegetation stretches from the Amboseli basin to the limit of vegetation at 4500 m.

The montane forest zone starts at approximately 1800 m, above the cultivated land, and continues through several sub-types to the forest-heath boundary at around 2700 m. The heathland vegetation, which is dense at 2700 m, diminishes in stature with altitude, becoming truly alpine above 3000 m, giving way to alpine desert above 4200 m. On the western and northeastern slopes large areas of natural forest have been replaced by conifer plantations.

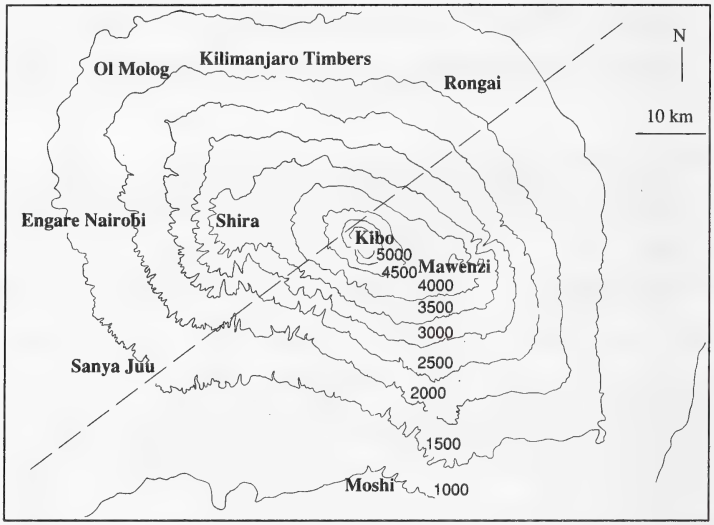

Figure 1. *Sketch map of Kilimanjaro showing 500-m contours. The area covered in the paper is west of the dotted line*

Species list

Nomenclature and sequence follow Britton (1980), with amendments from Turner *et al.* (1991).

Secretary Bird *Sagittarius serpentarius*
Common in arable and bushland where probably a breeding resident, but numbers seem to vary, with an influx from August onwards.

African White-backed Vulture *Gyps africanus*
Resident; breeding in montane forest to 2000 m on the northern slope. Congregates in large numbers (up to 40) on the carcasses of crop-raiding elephants, but usually the only vulture present.

Hooded Vulture *Necrosyrtes monachus*
Observed by Cordeiro (1994) at about 1900 m on the western slope; apparently scarce.

Lammergeyer *Gypaetus barbatus*
Breeding in the alpine zone. Adults and immatures may sometimes be seen scavenging in the area of Horombo hut at about 3650 m and has been filmed feeding on the Shira Plateau (Partridge Films/BBC: 'Islands in the African Sky', 1994). Nesting area not known, possibly on cliffs of western Kibo above the Shira Plateau, or on the Shira Ridge. In 1993 I found an ossuary on the Shira Cone at 3800 m. Also observed in 1994 on Mt Meru and Longido, and in 1992 lammergeiers were seen on Monduli Mountain (P. Morris, pers. comm.). Although it was first recorded from Kilimanjaro by Moreau (1936), Guest & Leedal (1954) failed to observe it during two months spent at high altitudes and King (1973) noted that it was scarce on Kilimanjaro; it is possible that at times birds move elsewhere and later recolonize the mountain from other areas.

Lammergeiers occasionally visit lower altitudes; one was seen at Simba Farm in 1990 (C. Allen, pers. comm.) and N.J. Cordeiro (pers. comm.) observed an individual scavenging at Ol Doinyo Sambu village on the north-western slope of Mt Meru.

Eurasian Marsh Harrier *Circus aeruginosus*
Winter and passage visitor to West Kilimanjaro arable land; never as common as Pallid and Montagu's Harriers.

Pallid Harrier *Circus macrourus*
Common winter visitor, October to April, to West Kilimanjaro arable land between October and April.

Montagu's Harrier *Circus pygargus*
Common winter visitor, as for Pallid Harrier, with adults and immatures being equally abundant. Both species 'quarter' arable fields flushing Harlequin Quail *Coturnix delegorguei* and Red-billed Quelea *Quelea quelea* which are caught and eaten on the wing (C. Stubbs, pers. comm. 1994).

African Marsh Harrier *Circus ranivorus*
Apparently an occasional visitor to West Kilimanjaro; observed in the arable bush-mosaic on 23 June 1990 after the departure of European migrants. N. J. Cordeiro observed an individual at a marsh near Sanya Juu 24 August 1994 (pers. comm.).

Harrier Hawk *Polyboroides typus*
Resident in mixed arable and bush country on West Kilimanjaro; recorded from open forest on the northern slope at 2000 m in 1992 and at 2300 m in 1994.

Brown Snake Eagle *Circaetus cinerascens*
The only record for the Kilimanjaro area is an individual observed at Sanya Juu on 19 August 1993 by N. J. Cordeiro (pers. comm.).

Short-toed Snake Eagle *Circaetus gallicus*
The race *C. g. pectoralis* (Black-chested Snake Eagle) is an uncommon resident in the arable-bush mosaic of West Kilimanjaro.

Bateleur ***Terathopius ecaudatus***
Common resident, probably breeding, in bush and arable land on both northern and western slopes.

Shikra ***Accipiter badius***
Resident in arable-bush mosaic; often seen flying very low above the road and darting into roadside vegetation after prey.

Great Sparrowhawk ***Accipiter melanoleucus***
Uncommon resident in forest at 2000 m on the northern slope; it is also known from the Ol Molog area (C. Stubbs, pers. comm. 1994). Moreau & Moreau (1939) record it from ravines below the forest edge at Rongai.

Little Sparrowhawk ***Accipiter minullus***
Uncommon resident of the forest edge and arable-bush mosaic, observed near Lerang'wa on the northern slope, and in farmland near Ol Molog, where it takes domestic chicks in the vicinity of habitation (C. Stubbs, pers. comm. 1994).

Rufous Sparrowhawk ***Accipiter rufiventris***
Apparently common resident in *Podocarpus* and *Hagenia* forest between 2500–2700 m on the northern slope; difficult to observe as it tends to remain in the canopy. Cordeiro (1994) recorded this species at the lower edge of the forest (1500–1700 m) on both the southern and western slopes.

African Goshawk ***Accipiter tachiro***
Resident in the forest on all slopes, but difficult to observe. At Kilimanjaro Timbers it was observed unsuccessfully chasing a Hamerkop *Scopus umbretta*, 23 June 1990. Cordeiro records (1994) that he has often caught this species in mist nets and notes that it had been overlooked by several previous authors.

Steppe Eagle ***Aquila nipalensis***
Passage migrant, usually in November and December, but apparently not usually remaining for long. Up to 30 have been observed following the plough on the West Kilimanjaro arable farms.

Tawny Eagle ***Aquila rapax***
Common breeding resident throughout the western and northern slopes below the forest; sometimes feeds on carrion with Steppe Eagles and vultures.

Wahlberg's Eagle ***Aquila wahlbergi***
A solitary individual was watched on 7 September 1991 on West Kilimanjaro by Cordeiro (1994), to 2000 m.

Augur Buzzard ***Buteo augur***
Abundant breeding resident in the arable-bush mosaic, often seen perched on telephone poles; melanistic birds are frequent. It is a scarce resident in open forest at 2000 m on the northern slope, probably breeding, although a solitary bird has been observed to inhabit the same, rather restricted area for four years, using regular perches. This individual has been observed to hunt *Rana* and *Xenopus* frogs in a small

marsh. At higher levels it is also present at low densities up to about 4200 m on the western slope of Kibo (King 1973 and pers. obs.).

[Common Buzzard *Buteo buteo vulpinus*
The only record of this migratory species in the Kilimanjaro area is a specimen collected by Kittenberger at Kibosho, outside the area covered by the present paper, 6 November 1904 (Kittenberger 1958). It is possible that the species may still occur occasionally; large numbers have recently been seen on passage in the Tarangire–Lake Manyara area some 150 km to the southwest (C. Foley, pers. comm. 1994) and it also occurs in small numbers in the Ngulia area of Tsavo West National Park, Kenya, some 100 km due east (G. C. Backhurst, pers. comm.).

Mountain Buzzard *Buteo oreophilus*
Common breeding resident between 2100 and 2700 m on the northern slope and probably fairly generally distributed at these altitudes. King (1973) believed it to be scarce on the western slope. On 24 June 1994 I observed a Mountain Buzzard eat the eggs from a nest of an Olive Pigeon *Columba arquatrix* in *Podocarpus* forest at 2500 m on the northern slope.

Booted Eagle *Hieraaetus pennatus*
One observed by C. Stubbs on several occasions in November 1993, on farmland near Ol Molog. This is the first record for Kilimanjaro.

African Hawk Eagle *Hieraaetus spilogaster*
Rare in the cultivated zone; one sighting only, from West Kilimanjaro 4 February 1990, but Cordeiro (1994) has also recorded it from 1700 m on the western slope, flying over the forest.

Lizard Buzzard *Kaupifalco monogrammicus*
N.J. Cordeiro (pers. comm.) considers this species to be reasonably common in cultivated areas near Sanya Juu, where he observed it in 1991 and 1993.

Long-crested Eagle *Lophaetus occipitalis*
Common breeding resident in the arable-bush mosaic and in the Londorossi plantation area to 2600 m (Cordeiro 1994); often seen perched on telephone poles. Also apparently resident in open forest at 2000 m on the northern slope.

Gabar Goshawk *Micronisus gabar*
Common in bush country below the forest; a melanistic individual was observed in October 1993 near Ol Molog (C. Stubbs, pers. comm.). An individual was briefly observed on 1 February 1994 at 2000 m in a clearing in the forest of the northern slope. That this species has a tendency to wander is further suggested by Moreau & Moreau (1939) who discuss a specimen collected by O. Neumann at 2700 m on the southern slope.

Pale Chanting Goshawk *Melierax poliopterus*
Apparently a common resident in *Acacia* bush below about 1600 m on both northern and western slopes.

Martial Eagle ***Polemaetus bellicosus***
Observed near Ol Molog in an area of small hills where it was believed to have been hunting guineafowl (C. Stubbs, pers. comm. 1994). Probably an occasional visitor to the area.

Crowned Eagle ***Stephanoaetus coronatus***
Common breeding resident in forest between 1900 and 2400 m, coinciding with the areas of highest monkey density. Believed to prey on Blue Monkey *Cercopithecus mitis*, Black and white Colobus *Colobus guereza*, Tree Hyrax *Dendrohyrax validus* and Red Duiker *Cephalophus natalensis* (Cordeiro 1992, and pers. obs.). Often seen circling overhead, usually in pairs, making the distinctive calls at which the monkeys rapidly remove themselves from the canopy. Also to be seen in spectacular display flights throughout the year.

Cuckoo Hawk ***Aviceda cuculoides***
Seen twice, 8 and 11 December 1991 (Cordeiro 1994) in forest at 1750 m on the western slope.

Black Kite ***Milvus migrans***
Common resident around human settlements, for example at Engare Nairobi. Migrants may also occur as large flocks of kites have been observed at Moshi, apparently on migration (e.g., hundreds, with Pied Crows *Corvus albus*, 6 January 1990).

Black-shouldered Kite ***Elanus caeruleus***
Common breeding resident in arable-bush mosaic. Often observed on telephone wires and poles.

Bat Hawk ***Macheiramphus alcinus***
Apparently the first record for Kilimanjaro was a sighting made in open forest at 2000 m (northern slope) at dusk on 16 November 1990; in the same area sightings also occurred at dusk on 11–12 September 1993. Its status is hard to judge; possibly it is only an irregular visitor. N. J. Cordeiro (pers. comm.) has seen this species in Moshi in July 1993 and June–July 1994.

Eastern Red-footed Falcon ***Falco amurensis***
A passage migrant, seen annually in varying numbers and proportions in flocks with other species. Believed to have been present in small numbers in a large flock of Lesser Kestrels and hobbies on West Kilimanjaro in November 1993; in early April 1994 large flocks of Eastern Red-Footed Falcons were present near Ol Molog, with only a few Lesser Kestrels among them (C. Stubbs, pers. comm. 1994). Fuggles-Couchman (1984) records a male collected at 1650 m at Ol Molog, 21 January 1946.

Lanner Falcon ***Falco biarmicus***
Not infrequent in northern Tanzania but apparently only noted in recent years in the Kilimanjaro area by N. J. Cordeiro, who observed a pair at Londorossi (2100 m) on 26 September 1991. He believed that they might be resident there (Cordeiro 1994). Fuggles-Couchman (1984) observed single birds in arable land near Ol Molog in April 1959.

Saker Falcon *Falco cherrug*
Britton (1980) notes that the only Tanzanian record is of a sighting at Engare Nairobi on 27 February 1957.

African Hobby *Falco cuvieri*
Noted on several occasions at all times of year at Simba Farm; possibly resident.

Taita Falcon *Falco fasciinucha*
Britton (1980) records this species from Kilimanjaro but the basis for this statement is unknown (D. A. Turner, pers. comm.).

Lesser Kestrel *Falco naumanni*
Common passage migrant in the arable-bush mosaic, often in flocks of several tens of birds; regularly seen perched on telephone wires, or hunting over freshly cultivated ground.

Peregrine Falcon *Falco peregrinus*
Has been observed on several occasions above open forest at 2000 m, and on 30 November 1993 stooping (and missing) at a Speckled Pigeon *Columba guinea* close above habitation. Also recorded from near Ol Molog (C. Stubbs, pers. comm.). Probably a scarce resident.

Hobby *Falco subbuteo*
A few were present in a large mixed flock of Lesser Kestrels and Eastern Red-footed Falcons on West Kilimanjaro in November 1993; presumably on passage.

Kestrel *Falco tinnunculus*
Occasionally observed on West Kilimanjaro; probably a scarce resident. Also known to occur and believed to breed in rocky country north of Mt Meru. It is also likely to occur on passage and may have been overlooked amongst Lesser Kestrels.

Pygmy Falcon *Polihierax semitorquatus*
Has been observed on the plains west of Kilimanjaro, where it may be a breeding resident.

Barn Owl *Tyto alba*
Abundant resident in the arable areas of West Kilimanjaro, often breeding in house roof cavities. In the dry area to the west of Kilimanjaro it breeds in caves on the small hill Ngasurai.

African Marsh Owl *Asio capensis*
Common resident in the arable–bush mosaic where it is believed to breed in the crops. Often seen squatting in the road at night, an often fatal habit.

Spotted Eagle Owl *Bubo africanus*
Resident in the Ol Molog area, but abundance not known. It is also found in Moshi.

[Mackinder's Eagle Owl *Bubo capensis mackinderi*
The first record of a large owl in the moorland and alpine zone was made during a University of Sheffield expedition in 1953 (Guest & Leedal 1954), when an unidentified eagle owl was seen and heard on Mawenzi (no altitude supplied) and the Lent Valley (4360 m). N. J. Cordeiro (pers. comm.) collected owl pellets at 3850 m in the Barranco Valley in 1984. In 1993 members of, coincidentally, another University of Sheffield expedition, reported an eagle owl flying overhead at dusk while camped at 3000 m, just below the Shira Plateau, during July. Pellets and droppings, believed to be from an owl were also seen on the Shira Ridge at over 3650 m (J. Colman, pers. comm.). The species has yet to be confirmed, but the altitude and the noted hooting at dusk (a conspicuous affirmation of their presence in the Teleki Valley of Mt Kenya (pers. obs.)), would strongly suggest that the Kilimanjaro birds are also Mackinder's Eagle Owls.

Verreaux's Eagle Owl *Bubo lacteus*
Cordeiro (1994) records this species from below the forest on the western and southern slopes; it is common in Moshi and I reared an individual at Kilimanjaro Timbers which had been obtained from children there. The bird became free-ranging and was regularly mobbed by Peregrines and Augur Buzzards, taking refuge in dense foliage.

African Wood Owl *Strix woodfordii*
Heard calling every night and sometimes at Kilimanjaro Timbers in forest to at least 2200 m.

[White-faced Scops Owl *Otus leucotis*
No scops owls have as yet been noted from western or northern Kilimanjaro, but this species may occur here as an injured bird believed to be of this species was found in Moshi in 1993 and Britton (1980) records it from Amboseli.

Discussion

The above list discusses 52 species of birds of prey and owls, of which three species—Common Buzzard, Mackinder's Eagle Owl and White-faced Scops Owl—require strict confirmation in the defined area. To an observer accustomed to northern Europe, where the sighting of any bird of prey is considered an event, this total seems remarkable for so small an area. That it is not unusual in East Africa may be confirmed by an examination of the records for the Mkomazi Game Reserve situated approximately 120 km east of Kilimanjaro, where 38 species of birds of prey have been confirmed and a further 13 are believed to occur (Coe 1993, Mkomazi '93 1993). The total in Lake Manyara National Park is even greater (H. Prins, pers. comm. 1994), reflecting the great habitat diversity and location of this park. By contrast, the relatively uniform plains around Nairobi were found to have only 22 species of birds of prey (Sorley & Andersen 1994). The distribution of birds of prey in East Africa seems to be governed by the presence of suitable habitat and prey species. For example,

Verreaux's Eagle *Aquila verreauxii* is present on Mt Kenya and at Mkomazi where diurnal Rock Hyrax *Heterohyrax brucei*, its main prey species, are abundant; it is absent from Kilimanjaro where only nocturnal tree hyraxes are present.

The Afromontane ecosystem is well known to comprise a series of vegetation zones (e.g., Hedberg 1951) and one of the most striking things to emerge from an examination of the list of the 50 species of birds of prey recorded from northern and western Kilimanjaro is their distribution in relation to the different vegetation zones. The arable-bush mosaic emerges as a habitat favoured by birds of prey, with no fewer than 35 species regularly occurring here. The other habitat-types are inhabited by far fewer species. A few species, such as the Augur Buzzard, occur regularly in several different zones, but the majority are quite habitat-specific.

That the arable-bush mosaic is favoured is no coincidence. The agricultural activities encourage large populations of rodents, game and passerine birds, which are assisted by the refugia of natural vegetation. This abundance of prey species is also exploited by a number of small carnivorous mammals including several mongooses, Wild Cat *Felis silvestris* and Serval *Leptailurus serval*, all of which are common in this zone (Grimshaw *et al.* in prep). The open terrain must also favourably affect the visibility and ease of capture of prey species. The birds of prey noted from the arable-bush mosaic may be considered to be generally predatory on rodents and small birds, although a few species, such as the Secretary Bird (which largely feeds on snakes) and the Harrier Hawk (eggs and nestlings) are more specialized in their requirements. Many of the birds of prey of the arable-bush mosaic are migrants or vagrants, but when these species are present the density of birds of prey is extremely high.

Inhabitants of the other vegetation zones are typically more specialized in their requirements. The two resident species confined to dry bush country, Pale Chanting Goshawk and Pygmy Falcon, are both recorded to feed largely on lizards and insects (Mackworth-Praed & Grant 1952).

In the forest zone three species of *Accipiter* snatch birds within the forest, while the Peregrine hunts birds above the canopy. The Bat Hawk is another aerial hunter. The Mountain Buzzard is said to feed largely on chameleons (Mackworth-Praed & Grant 1952, Williams & Arlott 1980) although it may also take small rodents (Maclean 1988). The Crowned Eagle hunts the larger forest mammals, especially monkeys (Mackworth-Praed & Grant 1952, Cordeiro 1992). Of the strict forest residents only the Wood Owl is a regular feeder on small mammals (although N. J. Cordeiro (pers. comm.) believes it may also take small birds); the generalist species occurring in the forest also take rodents.

In the alpine zone of Mt Kenya, Mackinder's Eagle Owl is believed to take small mammals and birds (Mackworth-Praed & Grant 1952), and on Kilimanjaro, if it indeed exists here, it would presumably prey on the abundant mice of this zone (Shore & Garbett 1991). The other predominantly alpine species, the Lammergeyer, is noted as a feeder on bones (Maclean 1988) and the low densities of this species on Kilimanjaro and other mountains is presumably a function of the scarcity of such food. However, on Kilimanjaro this diet is supplemented by feeding at rubbish pits near the tourist huts.

Sorley & Andersen (1994) have documented the significantly greater density of birds of prey within Nairobi National Park than outside it, which they believe reflects differing land-use practices in the two areas. For the area outside the park they cite direct persecution of birds of prey, together with the more insidious effects of habitat change and the usage of agricultural toxins as possible reasons for the reduced density of birds of prey. This is in direct contrast to the situation prevailing on western Kilimanjaro where the farming areas support both a wide diversity and high density of carnivorous animals of all kinds. A possible explanation of this difference is that farming in the area described by Sorley & Andersen is undertaken by small-scale cultivators, while on Kilimanjaro the areas most favoured are on large-scale, European-style arable farms with very low human population density, leading to less direct conflict. The poor economic situation in Tanzania has, until recently, largely minimized application of agricultural toxins, which may also be a factor in encouraging high prey populations. Some West Kilimanjaro farmers are now increasing their use of agricultural chemicals, with as yet unknown effect.

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An annotated list of the birds of Gombe National Park, Tanzania

Craig B. Stanford and Peter Msuya

While the bird fauna of the game parks of East Africa have been fairly well-documented (Britton 1980, Brown *et al.* 1982), field ornithologists and birders have paid little attention to the western region of Tanzania, and to the coastal areas of Lake Tanganyika in particular. The two national parks on the lakeshore, Gombe National Park and Mahale Mountains National Park, are best known for their long-term studies of habituated wild chimpanzees. While Gombe National Park is a frequent destination for ecotourism in East Africa, few birders have systematically surveyed the area, and no distributional studies of the avifauna have been conducted. This is unfortunate, as the eastern shore of Lake Tanganyika is a biogeographical oddity, bearing faunal and floral affinities to West African forests rather than East African (Nishida 1990). In addition, the western rift area of western Tanzania appears to be a major migratory route for many transcontinental migrant bird species, including raptors Stanford 1994. As a contribution toward a more detailed description of the avifauna of this region, in this paper we summarize our observations of birds in and around Gombe National Park during the period 1991–1994.

Study area

Gombe National Park covers 50 km^2 of the northeastern shoreline of Lake Tanganyika of Tanzania. The park is bounded on the west by the lake, on the east by the western rift, and on the north and south by expanses of cultivation and villages. The terrain rises from an elevation of 700 m at the lakeshore to an elevation of over 1600 m, 4 km eastward at the highest point of the rift. The park is bisected by numerous steep valleys, some of them with flowing streams, that empty in to the lake. The ecology of the park is described by Clutton-Brock & Gillett (1979). Gombe is a mosaic of habitats, with high canopy riverine forest along the valley bottoms and lower canopy and more open woodland on the lower slopes. At higher elevations this woodland gives way to miombo, and patches of *Brachystegia* and *Uopaca* spp are interspersed with open grassland, while the rift itself is open grass and rock outcroppings. There is an apparent north-to-south gradient in vegetation within the park, perhaps due to local rainfall gradients, such that the northern valleys of the park are more lushly vegetated. This is noteworthy because the occurrence of bird species within the park appears to differ from north to south, probably in relation to the difference in vegetation, and a number of species have been seen in Mitumba valley in the north of the park but nowhere else within Gombe.

Most data in this paper were collected from two areas within the national park borders, with occasional records from cultivated or town areas just outside. CBS was based in Kakombe valley, at the centre of the park and within the core area of the main chimpanzee study community (Goodall 1986), during a study of the predator-prey ecology of red colobus monkeys and chimpanzees. Surveys and additional research time were spent in other valleys, particularly Mitumba valley at the northern edge of the park. CBS was present at Gombe from May–December 1991, May–November

1992, July–August 1993, and August–October 1994. PM was a park warden and also observed birds mainly in and around Kakombe valley. We recorded a total of 225 species within the national park, with four additional species found outside the park boundary in the Kigoma area. PM was present at Gombe more or less continuously from late 1991 through 1994. A larger list would certainly be compiled if more time were spent at the higher elevations, particularly during the migration and austral winter seasons. A full list of the species is given in Appendix 1 with notes on habitat use.

Comments on selected species

In this section we present details of the occurrence of any species seen at Gombe that potentially alter the status of the species as given in Britton (1980). English and zoological nomenclature follow Britton (1980). Additional comments on the occurrence of diurnal raptors is found in Stanford (1994).

Yellow-billed Stork ***Mycteria ibis*** Moderate numbers have been seen migrating north to south along the rift in October and November.

Black Kite ***Milvus migrans migrans*** The yellow-billed race *M. m. parasiticus* of this common species also occurs at Gombe, thought much less commonly than the nominate form.

Palm-nut Vulture ***Gypohierax angolensis*** Abundant at Gombe and along the lakeshore, though reported rare elsewhere in western Tanzania.

Wahlberg's Eagle ***Aquila wahlbergi*** Moderate numbers pass through Gombe in migration in early and middle September

Common Buzzard ***Buteo buteo*** Large numbers of this species pass through Gombe from north to south from late September through late October see Stanford (1994).

Trumpeter Hornbill ***Bycanistes bucinator*** Previously reported and may occur outside the park, but appears not to reside within the park.

Wood Owl ***Ciccaba woodfordii*** Previously reported in western Tanzania only from the Mahale Mountains, 160 km to the south.

Blue-breasted Kingfisher ***Halcyon malimbicus*** This is the most common of the forest kingfishers in this area, more so than the Woodland.

Pennant-winged Nightjar ***Macrodipteryx vexillarius*** Reported by Short *et al.* (1990) as a breeder in *Brachystegia* woodland in southern Tanzania; appears to occur at Gombe in the same habitat but only as a migrant.

Grey Woodpecker ***Mesopicos goertae*** Although Short *et al.* (1990) state that the olive woodpecker *M. griseocephalus* and this species form a largely allopatric superspecies complex with *griseocephalus* occurring along the western edge of Tanzania, the form at Gombe is clearly *M. goertae*.

Yellow-whiskered Greenbul Andropadus *latirostris* This species is the commonest pyctonotid at Gombe and is one of the commonest forest birds.

Red-capped Robin Chat *Cossypha natalensis* This species is the most abundant undergrowth bird in the wooded areas of the park. The plumage in this population is a much deeper orange colour than that shown in any guidebook illustration we have seen.

Collared Flycatcher *Ficedula albicollis* Recorded five times in miombo woodland on hillslopes, between 11 October and 7 December.

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Appendix 1: List of species recorded from Gombe National Park

Key

c common; likely to be seen or heard everyday.
fc fairly common; likely to be seen or heard more than 50 per cent of days in the field, but not everyday.
uc uncommon; likely to be seen or heard 20–50 per cent of days in the field.
r rare; sighted only once or a few times or perhaps highly seasonal in occurrence.

Phalacrocoracidae
Long-tailed Cormorant *Phalacrocorax africanus* fc
Greater Cormorant *Phalacrocorax carbo* uc winter resident
Yellow-billed Egret *Egretta intermedia* uc

Scopidae
Hamerkop *Scopus umbretta* r transient

Ciconiidae
Yellow-billed Stork *Mycteria ibis* uc transient
Marabou Stork *Leptoptilos crumeniferus* r

Threskiornithidae
Sacred Ibis *Threskiornis aethiopica* r
Glossy Ibis *Plegadis falcinellus* uc transient
Hadada *Bostrychia hagedash* uc transient

Anatidae
Egyptian Goose *Alopochen aegyptiacus* r migrant
Knob-billed Duck *Sarkidiornis melanotos* r
Spur-winged Goose *Plectropterus gambensis* r

Accipitridae
Palm-nut Vulture *Gypohierax angolensis* c
African White-backed Vulture *Gyps africanus* uc
Montagu's Harrier *Circus pygargus* r migrant
Harrier Hawk *Polyboroides radiatus* c
Bateleur *Terathopius ecaudatus* uc
Little Sparrowhawk *Accipiter minullus* uc
African Goshawk *Accipiter tachiro* uc
Verreaux's Eagle *Aquila verreauxii* r
Lesser Spotted Eagle *Aquila pomarina* uc migrant
Tawny Eagle *Aquila rapax* uc
Wahlberg's Eagle *Aquila wahlbergi* fc migrant, otherwise rare.
Augur Buzzard *Buteo augur* r
Common Buzzard *Buteo buteo* c migrant
African Hawk Eagle *Hieraaetus spilogaster* uc migrant
Long-crested Eagle *Lophaetus occipitalis* r
Gabar Goshawk *Melierax gabar* fc
Martial Eagle *Polemaetus bellicosus* fc
Crowned Eagle *Stephanoaetus coronatus* uc resident
Fish Eagle *Haliaeetus vocifer* r
Black Kite *Milvus migrans* c
Black-shouldered Kite *Elanus caeruleus* r
Bat Hawk *Machairhamphus alcinus* uc

Pandionidae
Osprey *Pandion haliaetus* r

Falconidae
Sooty Falcon *Falco concolor* uc migrant
Peregrine Falcon *Falco peregrinus* r
Hobby *Falco subbuteo* c migrant and winter resident
Kestrel *Falco tinniculus* fc at higher elevations
Pygmy Falcon *Polihierax semitorquatus* r

Phasianidae
Red-necked Spurfowl *Francolinus afer* fc
Hildebrandt's Francolin *Francolinus hildebrandti* uc

Numididae
Helmeted Guineafowl *Numida meleagris* r, formerly c

Jacanidae
Jacana *Actophilornis africanus* r transient

Charadriidae
Senegal Plover *Vanellus lugubris* uc migrant
Brown-chested Wattled Plover *Vanellus superciliosus* r migrant

Scolopacidae
Common Sandpiper *Actitis hypoleucos* fc migrant
Green Sandpiper *Tringa ochropus* uc migrant
Marsh Sandpiper *Tringa stagnatilis* r migrant

Glareolidae
Violet-tipped Courser *Rhinoptilus chalcopterus* r transient

Laridae
Grey-headed Gull *Larus cirrocephalus* uc
Lesser Black-backed Gull *Larus fuscus* fc, winter
Black-headed Gull *Larus ridibundus* uc, winter
White-winged Black Tern *Chlidonias leucopterus* fc winter, rare otherwise

Columbidae
Lemon Dove *Aplopelia larvata* r
Olive Pigeon *Columba arquatrix* r
Afep Pigeon *Columba unicincta* r
Ring-necked Dove *Streptopelia capicola* fc
Red-eyed Dove *Streptopelia semitorquata* fc
Blue-spotted Wood Dove *Turtur afer* c
Emerald-spotted Wood Dove *Turtur chalcospilos* c
Tambourine Dove *Turtur tympanistria* c
Green Pigeon *Treron australis* fc in north, r elsewhere

Musophagidae
Ross's Turaco *Musophaga rossae* fc
Livingstone's Turaco *Tauraco livingstonii* fc

Cuculidae
Didric Cuckoo *Chrysococcyx caprius* r
Emerald Cuckoo *Chrysococcyx cupreus* fc
Klaas' Cuckoo *Chrysococcyx klaas* r in miombo
Black and White Cuckoo *Clamator jacobinus* r
Levaillant's Cuckoo *Clamator levaillantii* r
Eurasian Cuckoo *Cuculus canorus* fc winter
African Cuckoo *Cuculus gularis* r winter
Red-chested Cuckoo *Cuculus solitarius* fc in winter

Thick-billed Cuckoo *Pachycoccyx audeberti* r in miombo.
Yellowbill *Ceuthmocares aereus* uc
White-browed Coucal *Centropus superciliosus* r

Strigidae
Spotted Eagle Owl *Bubo africanus* fc
African Wood Owl *Ciccaba woodfordii* r
Pearl-spotted Owlet *Glaucidium perlatum* fc

Caprimulgidae
Gabon Nightjar *Caprimulgus fossii* uc
Montane Nightjar *Caprimulgus poliocephalus* r
Standard-winged Nightjar *Macrodipteryx longipennis* uc
Pennant-winged Nightjar *Macrodipteryx vexillarius* uc migrant and winter resident

Apodidae
Eurasian Swift *Apus apus* c winter
Black Swift *Apus barbatus* uc
Palm Swift *Cypsiurus parvus* fc

Coliidae
Speckled Mousebird *Colius striatus* r in park, fc outside

Trogonidae
Narina's Trogon *Apaloderma narina* fc

Alcedinidae
Giant Kingfisher *Ceryle maxima* uc
Pied Kingfisher *Ceryle rudis* c
Striped Kingfisher *Halcyon chelicuti* r in miombo
Chestnut-bellied Kingfisher *Halcyon leucocephala* uc in miombo
Blue-breasted Kingfisher *Halcyon malimbica* c
Woodland Kingfisher *Halcyon senegalensis* uc
Pygmy Kingfisher *Ispidina picta* uc

Meropidae
Eurasian Bee-eater *Merops apiaster* c in winter, otherwise absent
Cinnamon-chested Bee-eater *Merops oreobates* c
Little Bee-eater *Merops pusillus* fc

Coraciidae
Lilac-breasted Roller *Coracias caudata* r
Eurasian Roller *Coracias garrulus* uc, winter
Broad-billed Roller *Eurystomus glaucurus* uc

Upupidae
Hoopoe *Upupa epops* uc

Bucerotidae
Crowned Hornbill *Tockus alboterminatus* fc

Capitonidae
Black-backed Barbet *Lybius minor* r
Black-collared Barbet *Lybius torquatus* r
Yellow-rumped Tinkerbird *Pogoniulus bilineatus* c
Yellow-fronted Tinkerbird *Pogoniulus chrysoconus* r

Indicatoridae
Lesser Honeyguide *Indicator minor* r in miombo

Picidae
Little Spotted Woodpecker *Campethera caillautii* fc in miombo
Nubian Woodpecker *Campethera nubica* r
Cardinal Woodpecker *Dendropicos fuscescens* uc

Grey Woodpecker *Mesopicos goertae* fc
Bearded Woodpecker *Thripias namaquus* r

Eurylaimidae
African Broadbill *Smithornis capensis* c

Alaudidae
Rufous-naped Lark *Mirafra africana* uc in miombo
Flappet Lark *Mirafra rufocinnamomea* uc in miombo

Hirundinidae
House Martin *Delichon urbica* c migrant
Striped Swallow *Hirundo abyssinica* fc at higher elevations
Angola Swallow *Hirundo angolensis* r
Red-rumped Swallow *Hirundo daurica* fc
African Rock Martin *Hirundo fuligula* uc in miombo
Eurasian Swallow *Hirundo rustica* c migrant
Wire-tailed Swallow *Hirundo smithii* fc at higher elevations
White-headed Rough-wing *Psalidoprocne albiceps* uc
Black Roughwing *Psalidoprocne pristoptera* fc
Banded Martin *Riparia cincta* r winter
African Sand Martin *Riparia paludicola* r

Dicruridae
Drongo *Dicrurus adsimilis* c

Oriolidae
African Golden Oriole *Oriolus auratus* c
Black-headed Oriole *Oriolus larvatus* r

Corvidae
Pied Crow *Corvus albus* uc
White-necked Raven *Corvus albicollis* uc

Paridae
African Penduline Tit *Remiz caroli* uc in miombo

Salpornithidae
Spotted Creeper *Salpornis spilonota* r

Timaliidae
African Hill Babbler *Alcippe abyssinica* fc
Brown Illadopsis *Trichastoma fulvescens* r
Arrow-marked Babbler *Turdoides jardineii* r
Black-lored Babbler *Turdoides melanops*

Campephagidae
Black Cuckoo Shrike *Campephaga flava* c migrant, otherwise r
Grey Cuckoo Shrike *Coracina caesia* uc
White-breasted Cuckoo Shrike *Coracina pectoralis* r

Pycnonotidae
Yellow-whiskered Greenbul *Andropadus latirostris* c
Honeyguide Greenbul *Baeopogon indicator* r
Yellow-throated Leaflove *Chlorocichla flavicollis* uc
Nicator *Nicator chloris* r
Fischer's Greenbul *Phyllastrephus fischeri* c
Yellow-streaked Greenbul *Phyllastrephus flavostriatus* r
Common Bulbul *Pycnonotus barbatus* c

Turdidae
Brown-chested Alethe *Alethe poliocephala* c
Bearded Scrub Robin *Cercotrichas barbata* r

White-browed Scrub Robin *Cercotrichas leucophrys* r in miombo
Spotted Morning Thrush *Cichladusa guttata* r in miombo
White-browed Robin Chat *Cossypha heuglini* uc
Red-capped Robin Chat *Cossypha natalensis* c
Snowy-headed Robin Chat *Cossypha niveicapilla* r
White-starred Forest Robin *Pogonocichla stellata* fc
Cliffchat *Thamnolaea cinnamomeiventris* r
Northern Olive Thrush *Turdus abyssinicus* fc in miombo

Sylviidae
Brown-headed Apalis *Apalis alticola* r
Yellow-breasted Apalis *Apalis flavida* fc in miombo
Grey-backed Camaroptera *Camaroptera brachyura* c
Singing Cisticola *Cisticola cantans* fc in miombo
Yellow-bellied Eremomela *Eremomela icteropygialis* uc in miombo
Icterine Warbler *Hippolais icterina* r migrant/winter resident
Yellow-bellied Hyliota *Hyliota flavigaster* fc in miombo
Willow Warbler *Phylloscopus trochilus* uc winter
Brown Woodland Warbler *Phylloscopus umbrovirens* r
Tawny-flanked Prinia *Prinia subflava* uc
Moustached Warbler *Sphenoeacus mentalis* uc

Muscicapidae
Grey Flycatcher *Bradornis microrhynchus* uc
Pale Flycatcher *Bradornis pallidus* fc winter
Collared Flycatcher *Ficedula albicollis* uc winter
White-eyed Slaty Flycatcher *Melaenornis chocolatina* fc
Dusky Flycatcher *Muscicapa adusta* uc
Spotted Flycatcher *Muscicapa striata* c winter
Chin-spot Batis *Batis molitor* fc
Wattle-eye *Platysteira cyanea* r
Black-throated Wattle-eye *Platysteira peltata* c
White-tailed Blue Flycatcher *Erannornis albicauda* r
Red-bellied Paradise Flycatcher *Terpsiphone rufiventer* fc
Paradise Flycatcher *Terpsiphone viridis* fc
Crested Flycatcher *Trochocercus cyanomelas* fc winter

Motacillidae
Striped Pipit *Anthus lineiventris* uc in miombo
Richard's Pipit *Anthus novaeseelandiae* uc
African Pied Wagtail *Motacilla aguimp* c
Mountain Wagtail *Motacilla clara* uc

Malaconotidae
Black-backed Puffback *Dryoscopus cubla* fc
Northern Puffback *Dryoscopus gambensis* uc
Tropical Boubou *Laniarius ferrugineus* fc
Lühder's Bush Shrike *Laniarius luehderi* fc
Grey-headed Bush Shrike *Malaconotus blanchoti* r
Black-headed Tchagra *Tchagra senegala* uc

Laniidae
Fiscal *Lanius collaris* c in miombo
Grey-backed Fiscal *Lanius excubitorius* uc

Prionopidae
Helmet Shrike *Prionops plumata* uc in miombo
Retz's Helmet Shrike *Prionops retzii* fc

Sturnidae
Violet-backed Starling *Cinnyricinclus leucogaster* c
Blue-eared Glossy Starling *Lamprotornis chalybaeus* uc

Nectariniidae
Collared Sunbird *Anthreptes collaris* r
Violet-backed Sunbird *Anthreptes longuemarei* r
Amethyst Sunbird *Nectarinia amethystina* uc in miombo.
Blue-throated Brown Sunbird *Nectarinia cyanolaema* r
Olive Sunbird *Nectarinia olivacea* c
Green-throated Sunbird *Nectarinia rubescens* r
Scarlet-chested Sunbird *Nectarinia senegalensis* r
Variable Sunbird *Nectarinia venusta* c

Ploceidae
Grosbeak Weaver *Amblyospiza albifrons* r
Red-headed Weaver *Anaplectes rubriceps* uc
Southern Red Bishop *Euplectes orix* r
Dark-backed Weaver *Ploceus bicolor* c
Little Weaver *Ploceus luteolus* r
Vieillot's Black Weaver *Ploceus nigerrimus* r
Holub's Golden Weaver *Ploceus xanthops* r
Chestnut Sparrow *Passer eminibey* r
Grey-headed Sparrow *Passer griseus* c
Yellow-throated Petronia *Petronia superciliaris* uc in miombo
Red-billed Firefinch Indigo Bird *Hypochera chalybeata* r

Estrildidae
Waxbill *Estrilda astrild* fc
Peters' Twinspot *Hypargos niveoguttatus* c
African Firefinch *Lagonosticta rubricata* c
Green-backed Twinspot *Mandingoa nitidula* fc
Black-bellied Seed-cracker *Pyrenestes ostrinus* r
Green-winged Pytilia *Pytilia melba* c
Red-headed Bluebill *Spermophaga ruficapilla* uc
Red-cheeked Cordon-bleu *Uraeginthus bengalus* c
Black and White Mannikin *Lonchura bicolor* r
Bronze Mannikin *Lonchura cucullata* fc
Magpie Mannikin *Lonchura fringilloides* uc

Fringillidae
Cabanis' Bunting *Emberiza cabanisi* uc in miombo
Golden-breasted Bunting *Emberiza flaviventris* uc in miombo
Yellow-rumped Seed-eater *Serinus atrogularis* uc
Stripe-breasted Seed-eater *Serinus gularis* r
Yellow-fronted Canary *Serinus mozambicus* r
Brimstone Canary *Serinus sulphuratus* r

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Distribution and abundance of birds in tidal creeks and estuaries of the Kenyan coast between the Sabaki River and Gazi Bay

J. Seys, G. Moragwa, P. Boera and M. Ngoa

From January 1994 regular counts of wetland birds have been carried out by a team of researchers from the Kenya Marine Fisheries Research Institute—in close co-operation with the National Museums of Kenya, Department of Ornithology—in the major creek systems between Gazi Bay, north of Msambweni and Sabaki River at the Kenya coast. Total numbers in the area under study (Gazi Bay, Port Reitz, Tudor Creek, Mtwapa Creek, Kilifi Creek, Mida Creek and Sabaki River mouth) were estimated at 10 500, birds in September 1994 and 15 000 in February–March 1994. Palaearctic shorebirds form the majority (6500, 61 per cent and 11 000 73 per cent, respectively), followed by terns and gulls (2900, 28 per cent and 2300, 15 per cent) and large wading birds (500, 5 per cent and 800, 5 per cent).

Sixty different species were recorded with shorebirds best represented (23 species), followed by large wading birds (15 species) and gulls and terns (ten species). Only 20 species were found in nearly all the studied areas; the others have a more restricted distribution.

Mida Creek and Sabaki River mouth are the most important bird areas with 75 per cent of the total numbers and 80 per cent of the species. Out of the group of creeks, only Mida Creek (55–68 per cent) and Port Reitz/Tudor Creek (20–21 per cent) hold more than 10 per cent of the total number.

The Sabaki River mouth is characterized by large numbers of gulls and terns, a resident group of Lesser Flamingos *Phoeniconaias minor* and some rare species such as Broad-billed Sandpiper *Limicola falcinellus*. Mida Creek has a small overwintering population of Greater Flamingos *Phoenicopterus ruber* and an internationally important concentration of Crab Plovers *Dromas ardeola* (maximum 800). It is a stronghold at the Kenya coast for many shorebird species. Abiotic characteristics of the creeks determine the relative abundance of different trophic groups of birds, with benthivores dominant in Mida Creek and Port Reitz/Tudor (85 per cent), but much less so in the other creeks (50–60 per cent) and in Sabaki River mouth (38 per cent).

Temporal patterns of abundance and diversity are illustrated with data from Mida Creek and Gazi Bay. The importance of different habitats within the creeks and estuaries is discussed and suggestions towards future coastal wetland ornithological research are given.

Birds are widely recognized as good bio-indicators in monitoring environmental changes (Koskimies 1989, Morrison 1986). They move away actively from conditions unfavourable in terms of food availability, disturbance, etc. Relatively simple counting methods with a minimum of equipment can do a lot to obtain valuable information on bird distribution and abundance, reflecting in one way or another the state of the

environment (Pomeroy 1992). In many tropical and subtropical countries with vast natural systems to be monitored, bird counting can offer an ideal and affordable tool for easy monitoring, especially with the frequent lack of funds for detailed scientific studies.

In addition, basic data on bird abundance and bird diversity can be of over-riding importance in assessing the value of natural habitats and hence are essential tools for policy-making.

As reflected in many publications, ornithology in Kenya is well-organized with a well-structured framework and an active network of volunteers. *A bird atlas of Kenya* was produced in 1989 (Lewis & Pomeroy 1989) and data on bird distribution are being incorporated in a regional database. International co-operation in wetland bird research is illustrated by participation in the IWRB-counts (International Waterfowl and Wetland Research Bureau) carried out on the Rift Valley lakes since 1991 by the National Museums of Kenya, Department of Ornithology.

However, data on birds in Kenyan coastal estuaries, mangrove creeks and along beaches are rather scarce and many papers deal with single observations of rare species (e.g. Brown 1973, Britton & Duffus 1974, Cunningham-van Someren 1972, Taylor 1978, 1982 a, b).

Data on migration timing, on status and age structure, and on moult and weights have been obtained for a few shorebird species during a mist-netting and ringing programme at Mida Creek from 1978–1985 (Pearson & Britton 1980). Although shorebirds have quite frequently been counted at certain high tide roosting areas of the coast (Britton & Britton, 1976, Bryant, 1980), no systematic survey of numbers appears to have been attempted for any substantial stretch of the coast, apart from one mid-winter count made along 50-km of shore south of Mombasa by Pearson (1984). Terns were treated by Britton (1977) and the breeding seasons of gulls and terns by Brown & Britton (1980)

The need to collect additional data at the coast on a wider scale was remedied in 1994 by the Kenya Belgium Project in Marine Sciences (KBP) and the Kenya Marine and Fisheries Research Institute (KMFRI) in the training of a group of ornithologists in close co-operation with the National Museums of Kenya.

This paper presents the results of counts carried out by this KBP/KMFRI-team in 1994–1995 in all the major tidal creeks and estuaries between the Sabaki River (north of Malindi) and Msambweni, 190 km south. Another publication on the results of an extensive survey of the beaches and creeks of the southern half of the Kenya coast in February 1995 by National Museum and KMFRI staff is in preparation.

Methodology

Birds of five tidal creeks between Gazi Bay (50 km south of Mombasa) and the Sabaki River (140 km north of Mombasa) (Fig. 1) were counted in February–March 1994 and September 1994 (Table 1). In Gazi Bay and Mida Creek five additional counts were made in 1994–1995 in order to study the temporal distribution pattern over the year. The Sabaki River mouth was counted during one visit in September 1994.

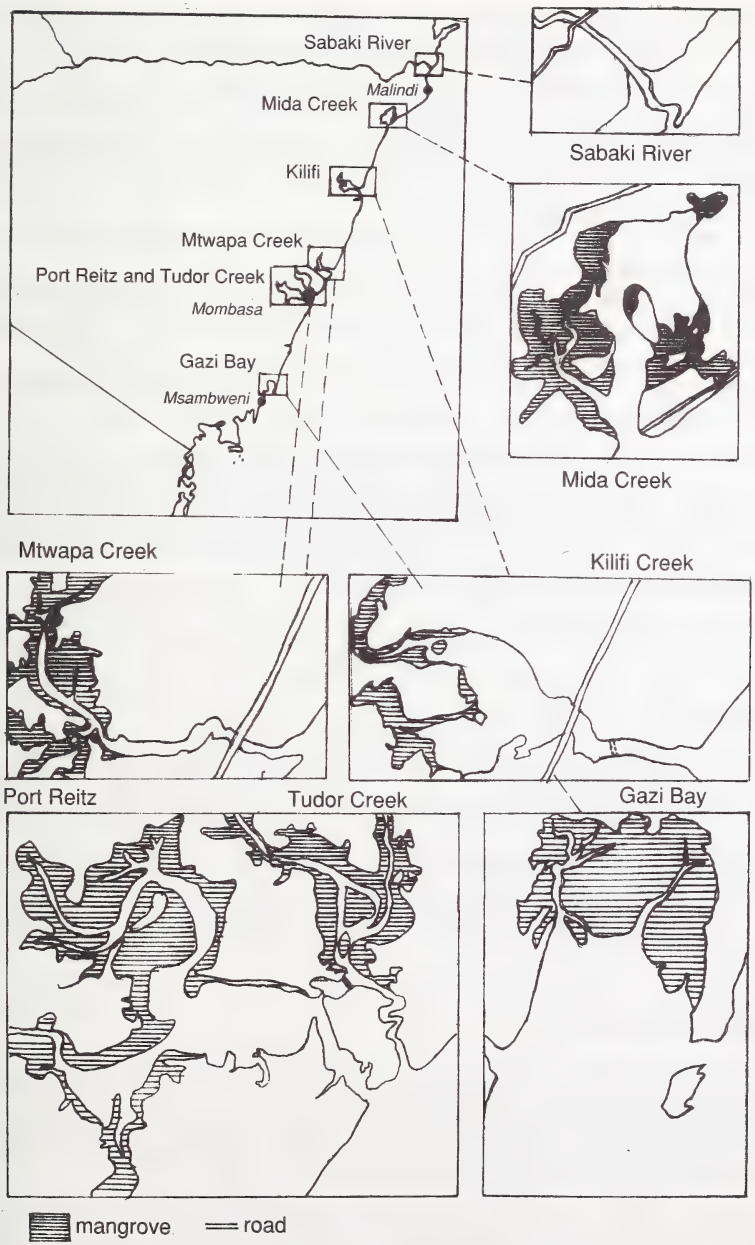

Fig. 1. *Maps of the study area at the Kenya coast showing the five creek systems and the Sabaki River mouth*

The counting method consisted of recording all the birds sighted during high-tide boat trips in a rubber dinghy along the banks of the creeks. These boat counts took 3–6 h (depending on the size of the creek) and as far as possible all the banks of the major channels were surveyed. In Mida Creek, where the high numbers of waders could not be assessed properly from a rubber dinghy, boat counts were complemented with a high-water roost count from the land. At the Sabaki River, numbers were assessed by visiting the site on foot during low tide.

For further analysis, Tudor Creek and Port Reitz were considered as two branches of one big creek and data from both systems were combined.

Most birds sighted were identified to species, numbers were counted and, where possible, additional notes on plumage and behaviour were made. Observations of terrestrial species are omitted since they are not dependent on wetlands.

Nomenclature follows Britton (1980) and the subdivision into trophic guilds is derived from *The birds of Africa* (Brown *et al.* 1982, Urban *et al.* 1986, Fry *et al.* 1988, Keith *et al.* 1992). Trophic guilds include piscivores (fish-eating), benthivores (mainly relying on estuarine invertebrates) and omnivores (a mixed group of herbivores, insectivores, scavengers and predators of mammals). Therefore the majority of the omnivores are birds feeding mainly outside the creeks and therefore not very dependent on the creeks in terms of food supply.

Results

General

A total of 60 species of wetland birds has been recorded during the February/March and September 1994 counts of the different areas. The majority are shorebirds (23 species), gulls and terns (ten species) and egrets, herons, storks, spoonbills and ibises (15 species).

The total number of wetland birds counted in the five creek systems in February/March was 8921 and only 3873 in September. If the Sabaki River mouth is included, a total of 10 186 birds was found for September (Sabaki not counted in February/March 1994).

Spatial distribution

The highest numbers of birds and bird species were counted in Sabaki River, Mida Creek and, to a lesser extent, in Tudor Creek/Port Reitz (Table 2). From the five creek systems, only Mida Creek (55–68 per cent of the total number) and Tudor Creek/Port Reitz (20–21 per cent of the total number) contribute substantially to the count total. Each of the other areas never held more than 10 per cent.

From the 60 species overall, about 20 species were observed in nearly all the areas under study. The other 40 species have a more restricted distribution or are rather uncommon along the Kenya coast.

Whereas most areas are numerically dominated by Palaearctic shorebirds, **Sabaki**

Table 1. *Dates of the counts of birds in the wetlands of the Kenya coast presented in this paper (* = high water roost count)*

Sabaki River mouth	Mida Creek	Kilifi Creek	Mtwapa Creek	Tudor Creek	Port Reitz Creek	Gazi Creek
1994						28.01
	26.01–09.02*	24.02	28.03	18.02	23.02	31.03
	10.03–23.03*					09.05
	21.04*–22.04					21.06
	20.05*–24.05					20.07
13.09	06.09*–12.09	07.09	15.09	08.09	14.09	16.09
1995	01.03–15.03*					15.03

River has a high number of terns and gulls and Lesser Flamingos as well. The sandbanks in the mouth of the river are an important roosting site for at least seven species of tern and two gulls and the silty tidal flats provide feeding for hundreds of Lesser Flamingos and a few thousand shorebirds.

Broad-billed Sandpipers and White-fronted Plovers *Charadrius marginatus* are restricted to this area while Marsh Sandpipers *Tringa stagnatilis* are most abundant here. Because of the presence of fresh water pools, species such as Spur-winged Plover *Vanellus spinosus*, White-faced Whistling Duck *Dendrocygna bicolor* and Madagascar Pratincole *Glareola ocularis* are present. A small group of Water Dikkops *Burhinus vermiculatus* can be found along the banks of the river.

Mida Creek has a small population of Greater Flamingos (maximum 200); gulls are typically absent. This creek has the greatest concentration of Palaearctic shorebirds within the study area and is particularly renowned for its non-breeding population of the uncommon Crab Plover *Dromas ardeola*. The world population of this species is estimated as only 50 000–100 000 birds (P. Hockey, pers. comm.), of which 500–800 are resident at Mida Creek during the northern winter. The rich crab fauna on the extensive tidal flats seem to attract Crab Plovers and also Gull-billed Terns *Gelochelidon nilotica*, Great Sandplovers *Charadrius leschenaultii*, and Eurasian Curlews *Numenius arquata*. Small numbers of Crab Plovers and Curlews were also recorded at the Sabaki River mouth.

Opportunistic species such as Black-headed Gulls *Larus ridibundus* and Sooty Gulls *L. hemprichii* are attracted to human settlements and found at **Port Reitz.** Considerable numbers of gulls are also present at roosting sites at the Sabaki River, probably because of the proximity of Malindi town and the activity of a beam-trawler fishing fleet operating from there.

Gazi Bay is the only creek with a small resident population of Long-tailed Cormorants *Phalacrocorax africanus*, Palm-nut Vultures *Gypohierax angolensis* and Woolly-necked Storks *Ciconia episcopus*.

Table 2. *Results of February/March ([1]) and September 1994 ([2]) coastal bird counts in five creeks (MI = Mida Creek; KI = Kilifi Creek; MT = Mtwapa Creek; TP = Tudor Creek/Port Reitz; GA = Gazi Bay) and one river mouth (SA = Sabaki River) at the Kenya coast. (*:* Charadrius leschenaultii/C.mongolus *combined; ** = global count of* C. leschenaultii, C. mongolus, Calidris minuta *and* C. ferruginea*)*

Species	MI[1]	MI[2]	KI[1]	KI[2]	MT[1]	MT[2]	TP[1]	TP[2]	GA[1]	GA[2]	SA
Phalacrocorax africanus	0	0	3	0	0	0	8	0	24	0	0
Pelecanus onocrotalus	0	0	0	0	0	0	0	0	0	0	5
P. rufescens	0	0	1	4	0	0	6	5	0	0	26
Bubulcus ibis	0	0	0	0	18	1	1	15	0	0	0
Butorides striatus	0	0	0	1	2	3	4	4	1	0	2
Egretta ardesiaca	3	1	1	0	0	0	0	0	3	0	0
E. gularis	0	6	0	0	0	0	0	0	7	0	0
E. garzetta	46	16	21	45	6	0	77	7	9	2	3
E. intermedia	0	0	0	3	0	0	0	0	0	0	0
E. alba	15	15	2	6	1	0	10	5	46	10	0
Ardea cinerea	14	18	1	2	1	0	12	8	9	0	4
A. melanocephala	18	0	0	0	38	0	1	0	1	0	1
A. goliath	1	0	0	1	0	0	1	0	0	0	0
Mycteria ibis	21	26	0	0	0	0	3	8	65	1	18
Ciconia episcopus	0	0	2	7	0	0	7	14	13	0	0
Bostrychia hagedash	0	0	0	0	10	0	0	1	0	0	0
Threskiornis aethiopica	12	15	101	38	6	11	15	12	57	98	16
Platalea alba	9	0	0	0	0	0	2	0	0	0	18
Phoenicopterus ruber	192	0	0	0	0	0	0	0	0	0	0
Phoeniconais minor	0	0	0	0	0	0	0	0	0	0	850
Pandion haliaetus	3	0	1	0	0	0	1	0	0	0	0
Milvus migrans	13	7	8	10	1	0	24	21	15	2	0
Haliaeetus vocifer	2	2	1	2	0	1	5	1	2	0	0
Gypohierax angolensis	0	1	0	0	0	0	1	0	2	1	0
Dromas ardeola	465	25	0	0	0	0	0	0	0	0	25
Recurvirostra avosetta	0	0	0	0	0	0	0	0	0	0	5
Burhinus vermiculatus	0	0	0	0	4	0	1	0	0	0	14
Glareola ocularis	0	0	0	0	0	0	0	0	0	0	200
Charadrius hiaticula	195	7	0	0	0	0	105	18	5	1	40
C. pecuarius	0	0	0	0	0	0	3	0	0	0	0
C. marginatus	0	0	0	0	0	0	6	0	0	0	15
C. mongolus	150	65	6	0	0	0	0	30*	0	65*	2100**
C. leschenaultii	100	195	0	0	0	0	0	*	0	*	**
Pluvialis squatarola	345	255	4	7	0	201	341	154	20	0	50
Vanellus spinosus	0	0	0	0	0	0	0	0	0	0	3
Calidris alba	0	2	0	0	0	0	0	0	0	0	20
C. minuta	1400	140	75	0	0	0	138	80	2	0	**
C. ferruginea	2360	600	0	2	0	0	565	145	11	8	**
Philomachus pugnax	0	0	0	1	0	0	0	1	0	0	0
Limosa lapponica	0	3	0	0	0	0	0	0	0	0	2
Numenius phaeopus	170	470	43	124	1	86	77	78	103	24	50
N. arquata	2	30	0	0	0	0	0	0	0	0	5
Tringa stagnatilis	0	0	0	0	0	0	0	0	0	0	4

Species	MI[1]	MI[2]	KI[1]	KI[2]	MT[1]	MT[2]	TP[1]	TP[2]	GA[1]	GA[2]	SA
T. nebularia	155	60	39	35	0	9	39	65	27	0	30
Xenus cinereus	140	40	0	1	0	12	28	24	0	15	2
Actitis hypoleucos	4	22	32	48	76	21	39	61	33	3	5
Arenaria interpres	2	4	0	0	0	0	0	0	0	0	2
small waders species	0	0	0	0	0	0	250	17	0	0	0
Larus hemprichii	0	0	2	0	1	0	50	0	2	0	75
L. ridibundus	0	0	0	0	0	0	21	0	0	0	0
L. fuscus	0	0	0	0	0	0	1	0	0	0	30
Gelochelidon nilotica	190	68	0	1	0	0	0	4	0	0	50
Sterna caspia	0	0	0	0	0	0	0	0	0	0	2
S. bergii	0	0	0	0	0	0	0	0	0	0	1
S. bengalensis	2	0	1	0	0	0	22	0	0	0	30
S. dougallii/S. hirundo	0	0	0	0	0	0	1	0	0	0	2600
S. albifrons/S. saundersi	2	0	0	0	0	0	2	0	0	0	5
Chlidonias leucopterus	0	3	0	0	0	0	2	0	0	0	0
Halcyon senegaloides	0	0	0	0	0	1	0	0	0	0	0
Alcedo cristata	0	0	0	0	0	2	0	1	0	1	0
Ceryle rudis	19	34	11	31	12	3	10	9	4	0	5
Total number of birds	6049	2134	355	369	177	351	1879	788	461	231	6313
No. of piscivores	93	100	32	72	18	8	122	38	129	12	2690
No. of benthivores	5531	1943	210	241	81	331	1635	683	242	118	2398
No. of omnivores	425	91	113	56	78	12	122	67	90	101	1225
Total number of species	30	29	20	20	14	12	36	26	23	13	40
No. of piscivorous species	10	8	10	8	4	4	14	7	8	2	10
No. of benthivorous species	15	17	6	8	3	6	12	13	9	8	22
No. of omnivorous species	5	4	4	4	7	2	10	6	6	3	8

Small groups of Pink-backed Pelicans *Pelecanus rufescens* can be encountered in most of the coastal creeks where they roost in mangrove trees. At the Sabaki River mouth small mixed groups of Pink-backed and White Pelicans *Pelecanus onocrotalus* were found. Species such as Cattle Egret *Bubulcus ibis*, Hadada Ibis *Bostrychia hagedash*, Yellow-billed Egret *Egretta intermedia*, Open-billed Stork *Anastomus lamelligerus* and Ruff *Philomachus pugnax* are rare visitors to the creeks, since their preferred habitats are fresh water areas or terrestrial biotopes rather than brackish or marine systems.

Skulking species such as the Green-backed Heron *Butorides striatus* are easily overlooked and are certainly underestimated. They were frequently observed at fish traps at the mouth of different estuaries (Boera *et al.*, in prep.). Large wading birds (egrets, herons, storks, ibises, spoonbills) have several communal roosting sites in the creeks and are found in gatherings of up to 150 birds in mangrove trees. They seem to remain faithful to the same roosting sites for long periods.

Shorebirds are found foraging on the tidal flats during low tides with a preference for the more silty and open areas. Deeper into the mangrove forests numbers of shorebirds are much smaller and dominated by Common Sandpipers *Actitis hypoleucos*. During high tide, Greenshanks *Tringa nebularia*, Whimbrels *Numenius phaeopus*, Grey Plovers *Pluvialis squatarola* and Terek Sandpipers *Xenus cinereus* are

also found roosting on mangrove trees. Plovers and other species of sandpiper prefer the more open areas, such as beaches, for roosting. On the tidal flats in the creeks and at Sabaki River mouth the most common species are Curlew Sandpiper *Calidris ferruginea*, Little Stint *C. minuta*, Grey Plover, Whimbrel, Great Sandplover and Mongolian Sandplover *Charadrius mongolus*. Great Sandplovers are dominant on sandy beaches (over 90 per cent), equally abundant as Mongolian Plovers on sandy tidal flats (Mida Creek) and less frequent on silty flats such as in Sabaki River mouth.

Ospreys *Pandion haliaetus* have been observed from September to April in most of the creeks but seem to be most common at Mida Creek (2–3 birds apparently regular). After catching medium-sized fish they can be seen devouring their prey on the sandbanks. Pied Kingfishers *Ceryle rudis* are common in all creeks but we only found a breeding colony in Kilifi Creek.

Trophic guilds

Benthivores are dominant in all the creeks (Fig. 2, Table 2) accounting for over 85 per cent in Mida Creek and Tudor Creek/Port Reitz, 50–60 per cent in the other creeks (not taking into account the aberrant value for Mtwapa Creek in September: the high percentage of benthivores in Mtwapa Creek in September was due to one large flock of shorebirds at a temporary roosting site at the mouth of the creek) but only 38 per cent

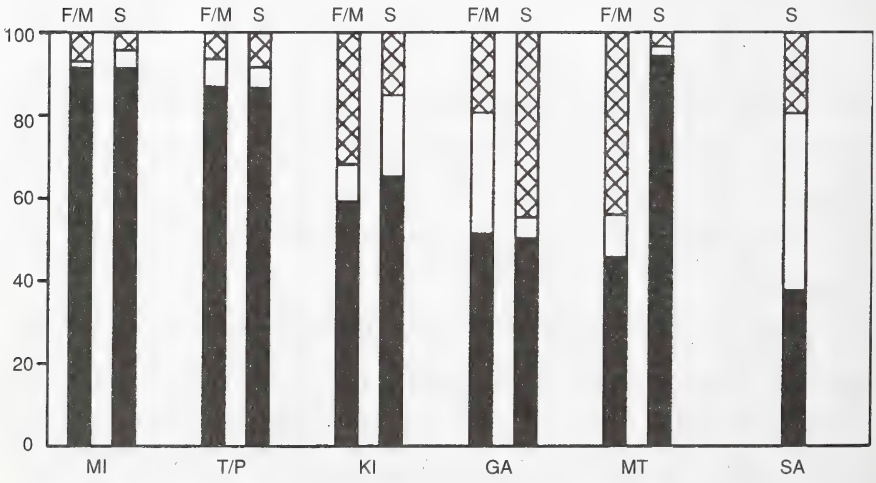

Fig. 2. *Relative abundance (in per cent) of the different trophic guilds of birds as found during a February/March (F/M) and a September (S) 1994 count of Mida Creek (MI), Tudor Creek/Port Reitz (T/P), Kilifi Creek (KI), Gazi Bay (GA), Mtwapa Creek (MT) and Sabaki River mouth (SA).* ***Key****: solid = benthivores, unfilled = piscivores, hatched = omnivores*

in Sabaki River. The low value in Sabaki is mainly due to the large numbers of flamingos (considered as herbivores are classified here under the omnivores) and terns and gulls (piscivores and omnivores).

Extrapolation

The total numbers of birds in the five creek systems between Gazi Bay and Mida Creek as described above are minimal values. Due to the technique used—counting from a rubber boat during high tide—a number of shorebirds might have left the estuary for high-water roost sites outside the area. Also, an additional number of birds can be added for some tidal channels in the mangrove woods of Mtwapa Creek and Tudor Creek/Port Reitz which were not counted completely. Therefore the total number of wetland birds in all the main creek systems between Msambweni and Malindi is estimated at about 10 000 in February/March and 4200 in September. Based on new data for Sabaki River collected during the February 1995 survey, we can assume that the total number of wetland birds in February–March at this estuary is not much higher than 5000 birds, compared to 6313 in September. The slightly higher number in September is caused by larger numbers of Roseate/Common Terns *Sterna dougallii/ hirundo* and Lesser Flamingos. A general total figure for all the creeks and estuaries between Sabaki River and Msambweni of 10 500 in February/March and 15 000 in September can be put forward. Shorebirds are most common (6500–11 000, or 61–73 per cent), followed by terns and gulls (2900–2300, or 28–15 per cent) and large wading birds (500–800, or 5 per cent in both periods).

Temporal distribution pattern in Gazi Bay and Mida Creek

Total numbers of birds peak in December–January and are minimal between May and July (Table 3, Fig. 3). The September counts give values of 28–46 per cent of the peak numbers. Migration of Palaearctic waders is the main cause of decreasing numbers in the coastal creeks from May onwards. In Mida Creek most of the shorebirds oversummer in small numbers. Only Great Sandplover, Common Sandpiper and Little Stint were not observed from May onwards.

Resident species also seem to disappear from the creeks during this period; some, such as Great Egrets *Egretta alba* and Pied Kingfishers apparently in search of suitable breeding areas, others probably because of newly available feeding areas (fresh water swamps) during the rainy season. There is a remarkable decline in the number of Pied Kingfishers in Mida Creek between April and May.

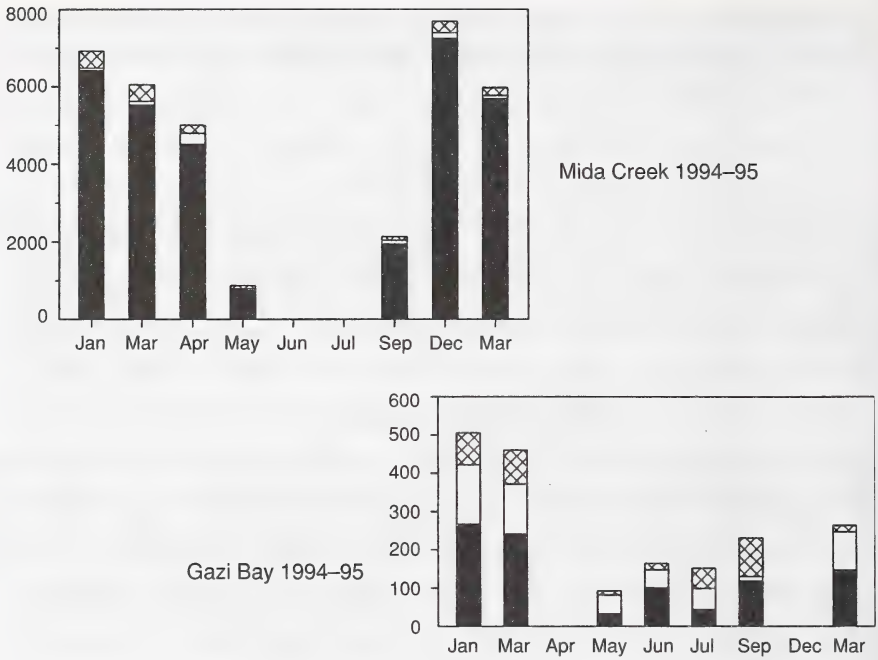

Fig. 3. *Temporal distribution pattern of coastal wetland birds as found during seven counts in Mida Creek and Gazi Bay in 1994–1995. Total numbers as well as numbers for each trophic guild are illustrated. Key to shading patterns as in Fig. 2*

Discussion

The results of this study are original in at least two aspects. First of all, a general survey of all the major creek systems of part of the Kenya coast has never been carried out before. The total number of birds found in this area in mid-winter was estimated at 15 000, including 11 000 shorebirds. For the same stretch of coast from Msambweni to the Sabaki, Pearson (1984) gave an estimate of almost 30 000 (shorebirds only), including birds from Gazi Bay and Mida Creek. Including all the creeks would bring his total number of shorebirds along this 200-km of coastline to 35 000, a figure very close to the value of 36 000 published by Summers *et al.* (1987).

Secondly, the data collected here include coastal bird species other than shorebirds. Large wading birds and other species dependent in one way or another on the coastal creeks are important indicators of the quality of the ecosystem. Regular counts of these birds can reveal a lot about changes occurring in their habitat, making counts important as a management tool.

The comparison of the abundance and diversity of birds in the different creeks reveals that Mida Creek and the Sabaki River mouth as the most important areas.

Table 3. *Number of wetland birds in Gazi Bay and Mida Creek as counted during seven surveys in 1994–95. The dates of the counts are listed in Table 1. Total number of birds, number of species and abundance of the different trophic guilds are included*

	Gazi Bay							Mida Creek						
Species	Jan	Mar	May	Jun	Jul	Sep	Mar	Jan	Mar	Apr	May	Sep	Dec	Mar
Phoenicopterus ruber	0	0	0	0	0	0	0	188	192	105	0	0	57	97
Phalacrocorax africanus	3	24	0	0	0	0	11	0	0	1	0	0	0	0
Ardea cinerea	6	9	2	0	1	0	0	6	14	16	13	18	2	13
Ardea melanocephala	0	1	0	0	0	0	2	11	18	6	0	0	0	5
Ardea goliath	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Egretta alba	113	46	5	1	21	10	57	0	15	7	1	15	0	9
Egretta garzetta	1	9	7	1	8	2	9	25	46	59	4	26	5	37
Egretta gularis	0	7	0	0	2	0	0	0	0	0	0	6	0	1
Egretta ardesiaca	2	3	2	0	0	0	6	0	3	4	2	1	0	3
Bubulcus ibis	30	0	0	0	0	0	0	0	0	14	3	0	0	0
Butorides striatus	0	1	1	0	0	0	0	0	0	0	0	0	0	0
Mycteria ibis	59	65	50	91	55	1	40	30	21	20	24	16	9	10
Ciconia episcopus	0	13	7	3	2	0	1	0	0	0	0	0	1	0
Anastomus lamelligerus	0	0	0	0	0	0	0	0	0	22	0	0	0	0
Threskiornis aethiopicus	44	57	3	10	48	98	6	14	12	20	51	15	0	8
Bostrichia hagedash	0	0	0	0	1	0	0	0	0	5	2	0	0	0
Platalea alba	0	0	0	0	0	0	0	1	9	11	0	0	0	0
Gypohierax angolensis	2	2	1	2	0	1	1	0	0	0	0	1	0	0
Pandion haliaetus	0	0	0	0	0	0	0	2	3	1	0	0	0	3
Haliaetus vocifer	1	2	0	0	0	0	0	2	2	2	2	2	1	0
Milvus migrans	5	15	0	2	2	2	6	3	13	16	3	7	3	9
Dromas ardeola	0	0	0	0	0	0	0	800	465	300	170	25	666	490
Charadrius hiaticula	0	5	0	0	0	1	0	50	195	21	2	7	30	75
Charadrius leschenaultii	0	0	0	0	0	65	0	450	100	550	0	195	1000	1250
Charadrius mongolus	0	0	0	0	0	0	0	650	150	350	244	65	1500	1250
Calidris ferruginea	0	11	0	0	0	8	12	900	2360	1550	30	600	1500	900
Calidris alba	0	0	0	0	0	0	0	5	0	3	0	2	7	3
Calidris minuta	200	2	0	0	0	0	0	2500	1400	750	0	140	1500	500
Pluvialis squatarola	0	20	4	8	0	0	27	316	345	590	71	255	425	395
Actitis hypoleucos	1	33	0	0	12	3	4	5	4	6	0	22	12	6
Arenaria interpres	0	0	0	0	0	0	0	1	2	3	6	4	0	5
Xenus cinereus	0	0	0	1	0	15	35	200	140	185	39	40	100	250
Tringa nebularia	14	27	0	9	0	0	1	180	155	35	41	60	155	150
Numenius phaeopus	21	103	0	37	0	24	43	250	170	95	120	470	304	358
Numenius arquata	0	0	0	0	0	0	0	80	0	8	13	30	40	30
Limosa lapponica	0	0	0	0	0	0	0	1	0	0	1	3	3	2
Larus hemprichii	3	2	0	0	0	0	1	0	0	0	0	0	0	0
Sterna caspia	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Sterna bengalensis	0	0	9	0	0	0	0	20	2	148	6	0	123	19
Gelochelidon nilotica	0	0	0	0	0	0	0	220	190	45	22	68	230	84
Sterna albifrons/saundersi	0	0	0	0	0	0	0	0	2	4	0	0	10	3
Sterna hirundo/dougallii	0	0	0	0	0	0	0	0	0	7	0	0	0	0
Chlidonias leucopterus	0	0	0	0	0	0	0	0	0	0	0	3	2	0
Ceryle rudis	0	4	2	0	0	0	2	7	19	47	1	34	0	5
Alcedo cristata	1	0	0	0	0	1	0	0	0	0	0	0	0	0
Total number of birds	506	461	93	164	152	231	264	6918	6049	5006	871	2134	7685	5970
No. of piscivores	155	129	49	47	55	12	100	65	93	276	39	100	145	79
No. of benthivores	267	242	33	101	44	118	147	6417	5531	4519	751	1943	7249	5688
No. of omnivores	84	90	11	16	53	101	17	436	425	211	81	91	291	203
Number of species	17	23	12	11	10	13	18	29	30	35	24	29	25	30

These two areas together hold about 75 per cent of the total number of birds in the creeks of this 200-km stretch, and more than 80 per cent of the species list were recorded here. Species that are globally rare, such as the Crab Plover, are concentrated in Mida Creek, with numbers probably peaking at more than 1 per cent of the total world population. Other interesting species in these two areas are Broad-billed Sandpiper, White-fronted Plover, Lesser Flamingo, several tern and gull species at Sabaki and Greater Flamingo, Gull-billed Tern, Terek Sandpiper, Eurasian Curlew and Mongolian Plover at Mida.

Very specific environmental conditions in both areas apparently attract this rich avifauna. Within this context, one can wonder why Redshanks *Tringa totanus*, previously occurring in small numbers (5–20) at Mida Creek, were not detected in our survey. There are also indications that the number of Sanderlings *Calidris alba* is smaller than in the late seventies when the species was described as one of the commoner wader species occurring in thousands on all tidal sandflats and sandy beaches (Pearson & Britton 1980).

Differences in environmental parameters in the six creeks and estuaries are also illustrated by the different trophic roles played by the birds. Mida Creek and Tudor Creek/Port Reitz are dominated by benthivorous birds, whereas Sabaki River, and to a lesser extent Gazi Bay, have a much higher proportion of fish-eating birds. Monitoring these ratios in the future can help to reveal valuable information on changes occurring to the system.

The observed temporal distribution pattern in waders corresponds to previous observations. The main influx of adult Palaearctic waders on the Kenya coast occurs during August and September, followed by a peak in October in numbers of first-year passage birds (Pearson & Britton 1980). Local wintering populations appear to maintain full numbers up to early April, but dwindle rapidly later that month.

Within the areas under study, the different habitats play a different role for the avifauna. The tidal flats are certainly the areas with highest densities and feeding activity of mainly shorebirds and large wading birds. Silty flats such as in the Sabaki River mouth can carry high densities of sandpipers, while more sandy tidal flats have large numbers of plovers as well. Food availability in terms of small benthic organisms tends to be higher in fine sediments than in coarse ones while sandbanks are favourite habitats for certain crab species on which birds such as Crab Plovers, Gull-billed Terns and Great Sandplovers rely. While the mangrove system plays only a limited role in the feeding habits of these shorebirds, it is critical to the safety of certain species. At high tide, when the wide stretches of beach and mud are inaccessible, many shorebirds move upstream along the maze of channels and take shelter either on the last remaining stretches of mud, or in the lower parts of mangrove trees, preferring the stilt roots of *Rhizophora mucronata*. A number of herons and egrets, on the other hand, are highly dependent on mangroves. Although not encountered as such in the mangrove areas under study, many species breed in these forests. As a high-tide roosting site, taller open mangrove trees are preferred by mixed flocks of egrets, storks, ibises, spoonbills, pelicans and herons. Indirectly, large wading birds as well as shorebirds are dependent

on mangroves when the organic output of the forests as the triggering factor for the productivity of prey organisms such as molluscs, crustaceans, worms, etc is considered.

Since mangroves are much less affected by drought than other wetlands, they can also be important for passerines (Altenburg & Van Spanje 1989). Published data on the utilization of African mangrove forests by birds are limited to notes concerning the Gambia (Cawkell 1964), Sierra Leone (Field 1968) and Guinea-Bissau (Altenburg & Van Spanje 1989). Therefore, collection of data on passerine birds and their dependence on the mangroves is a priority for future research in the region. More effort should also go into monitoring breeding colonies of coastal wetland species and into detailed food-ecological work. Beach counts from the Tanzanian border up to Sabaki River (coverage 80 per cent) were conducted during an NMK/KMFRI survey in February 1995. However, no reliable data are available for the northern half of the Kenya coast. Counts of creeks and beaches in the southern half should be repeated at least once a year within the framework of the counts of the International Wetland and Waterfowl Research Bureau (IWRB).

It would be useful if ringing activities were to be resumed at certain key sites in order to obtain data on age structure, site fidelity (through colour marking), and moult.

Acknowledgements

We gratefully acknowledge funding for this research from the Kenya Belgium Project in Marine Sciences. We are also indebted to Dr E. Okemwa, the Director of KMFRI and Dr D. Van Speybroeck of UNEP for their support through the Eastern African Coastal and Marine Environment Resource Database and Atlas project. Grateful acknowledgment is made to G. De Putter who provided us so generously with the necessary optical equipment, to Barbara Simpson and her team and the Kenya Wildlife Service wardens of Watamu for logistical support and to many friends who assisted in one way or another. Last, but not least, we are indebted greatly to the National Museums of Kenya's Department of Ornithology for their essential role in the training component of this work. Special thanks go to Dr L. Bennun, J. Oyugi and O. Nasirwa.

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Scopus 19: 47–60, June 1995 Received 31 May 1995

Corrigenda

In J. S. Ash's paper "Bird-ringing recoveries from Ethiopia: II", *Scopus* 17, the recovery date of the Tropical Boubou *Laniarius aethiopicus* at the foot of p. 116 should have been 11.05.75.

Short communications

Notes on birds in Ethiopia

During a short visit to Ethiopia between 26 November and 9 December 1994, a number of interesting records were made by M. Lambarth, S. Fisher and me, including what would appear to be the first record of the Bronze-winged Courser *Rhinoptilus chalcopterus* for the country.

Harwood's Francolin *Francolinus harwoodi* A pair was seen at the roadside 200 m north of the Jemma Bridge on the road to Alem Ketema on 6 December. At least two others were heard calling, one each side of the road just south of the bridge. This species begins to call at first light and we saw the two roadside birds at 06:10. Birds continued to call for another hour or so but after that calling became sporadic or ceased altogether.

Bronze-winged Courser *Rhinoptilus chalcopterus* Two flushed in daylight and then observed at close range in the Jemma Valley between the Jemma River and Alem Ketema on 5 December. This appears to be the first record from Ethiopia, the statement in Urban & Brown (1971) and the statement and map in Urban *et al.* (1986) are apparently incorrect. Dr J. S. Ash (*in litt.*) states that he has been unable to trace a record of this species in Ethiopia. All the records supplied to him by Dr D. W. Snow for inclusion in the latter's *Atlas of speciation in African non-passerine birds* (Snow 1978) were from Eritrea. The plot for Ethiopia proper in Snow (*op. cit.*) was presumably in error.

African White-winged Dove *Streptopelia reichenowi* At least 20 seen and heard calling along the Daua River at Melkha Ghuba on 28 November; some were photographed. Most appeared to be paired and there was much calling and display. The birds were confined to a narrow strip of riverine vegetation; there are no borassus palms in the vicinity.

Prince Ruspoli's Turaco *Tauraco ruspolii* One was seen and photographed in typical habitat 15 km south of Kibre Mengist on the Wendo–Negele road on 27 November. The bird was seen in a flowering acacia tree and also visited several other deciduous trees in the immediate area where some fruiting trees were present. The bird did not make any typical turaco calls although it uttered a curious high-pitched *dzzuit* anxiety note when I stalked it to obtain photographs.

Sidamo Lark *Heteromirafra sidamoensis* At least five were found in grassland at the junction of the Filtu–Arero tracks, 13 km south of Negele on 28 November. This record represents the first field observation of this species which was only previously known from two specimens (*vide* Robertson in press).

White-tailed Swallow *Hirundo megaensis* One was seen at a site 28 km north of Mega on the main Mega–Yavello road on 29 November. It was seen flying low over the scattered acacia trees and also perched in one. A culvert about 2 km north of this site had the remains of at least eight mud-cup nests which might possibly have belonged to this species. No other hirundines were seen in the area.

Sombre Rock Chat ***Cercomela dubia*** A pair was found and watched at length in a dry gully with some outcrops of lava 39 km north of the Awash National Park gate on the road from Ankober to Awash (north of the Kesem River) on 7 December. This species is apparently seldom recorded.

African Moustached Warbler ***Sphenoeacus mentalis*** One was seen in lush vegetation at a roadside stop 15 km south of Agere Selem on the Wendo–Negele road (altitude 2650 m) on 27 November. All previous records are from southwestern Ethiopia and Urban & Brown (1971) give no records east of the Rift Valley.

Wood Warbler ***Phylloscopus sibilatrix*** One in juniper forest about 9 km west of Yavello on 29 November; this species is rarely recorded in Ethiopia.

Grey-headed Silverbill ***Lonchura griseicapilla*** Two at Melkha Ghuba on 28 November; apparently not well known in Ethiopia.

White-throated Seed-eater ***Serinus xanthopygius*** A single bird was seen feeding among rank vegetation at the base of the first part of the escarpment on the southern side of the Jemma Valley on 6 December.

Yellow-throated Seed-eater ***Serinus flavigula*** One was seen well and watched singing from the top of a low bush at the Melkha Ghebdu site described by Ash & Gullick (1990), 19 km below Ankober at 1350 m on 6 December. No other sightings were made despite spending over an hour at that site and making short stops at several other apparently suitable sites further on towards Awash.

Salvadori's Seed-eater ***Serinus xantholaema*** At least six seen and heard at the bend of the road at the bottom of the Weyb River gorge (1100 m) at Sof Omar at about 10:00 on 2 December. The birds were very active and flighty, singing briefly from the tops of acacia trees then dropping into impenetrable vegetation where they were lost to view.

Acknowledgement

I wish to thank Dr John Ash for his valuable comments on these records.

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Book reviews

Kingfishers of sub-Saharan Africa by Phillip A. Clancey; pp. 212, 240 x 337 mm, hardback. Johannesburg: Jonathan Ball Publishers (Pty) Ltd, 1992. ISBN 0 947464 65 4. £40.00.

This superbly produced book, complete with 23 dazzling colour plates, further endorses Dr Phillip Clancey as the doyen of African ornithologists. Noted for his prolific and seemingly endless flow of books and scientific papers, one at times may easily overlook his other great talent, that as an artist. But the outstanding plates and line drawings (many of which are life-size) in this volume must surely rank among his finest work.

Altogether 20 kingfishers are discussed in detail, and each of the 23 plates is set against a natural Afrotropical background. The text of each species comprises comprehensive paragraphs on distribution, habitat and status, field characters and habits, calls, food, breeding biology, description and measurements, geographical variation, and subspeciation. A final comment on current taxonomic opinions accompanies most species accounts.

The author reviews the established historical background to the discovery and naming of all Afrotropical kingfishers, and in the substantial and informative introduction he reviews the current classification, world distribution, radiations within Africa, habitats, vocalizations and courtship, breeding, migrations and, finally, the conservation of this attractive group.

All readers, whatever their interest in African birds, will thoroughly enjoy this handsome book, and I hope appreciate the detail in which the author addresses each species. For my own part, I have one minor criticism concerning the choice of the White-collared Kingfisher for the cover. With its range restricted to mangrove stands in the Red Sea, one can hardly consider it truly representative of the Afrotropical kingfishers. I personally would have much preferred to see a more widespread species depicted, either the Giant or Woodland. Nevertheless, it is a truly superb book, with wonderful artwork, and without doubt value for money.

D. A. Turner

Birds to watch 2—The world list of threatened birds by N.J. Collar, M.J. Crosby and A.J. Stattersfield; pp. 407, 169 x 245 mm, softback. Cambridge: BirdLife International, 1994. ISBN 0 946888 302. £18.50 (+ £3.50 postage).

It's good to receive a book for review that contains so much information in such a compact but easy to use format. BirdLife International has adopted the new IUCN criteria for threat status and category. After 20 or so pages of introductory matter explaining the organization of the book, the nomenclature used (largely following

Sibley and Monroe's 1990 and 1993 works), and the new IUCN threat criteria, the main section of the book, 'Globally threatened species', takes off.

This globally threatened species section (182 pp) is arranged by families. Each species is clearly set out in one paragraph, of varying length, with countries of occurrence in bold type. Numerous references are included and each species account ends with the IUCN criteria, easy to spot at a glance.

The second half of the book covers extinct species (2½ pp), conservation dependent species (2 pp), data deficient species (7 pp), and near-threatened species (21 pp). Appendix 1—'Species listed by geopolitical unit'—of almost 100 pages, each country's threatened birds can be seen in a convenient way. This section also has the merit that it provides a pretty comprehensive list of all the world's current countries, a very useful item in itself! Two more short appendices (5½ pp) further analyse threatened species by geopolitical unit and list the threatened species in the three highest threat categories (Extinct in the Wild, Critical, and Endangered).

The list of references occupies 30 pp and is tremendously thorough and useful. The book ends with a further 30 pp of species index to the main parts of the book (the appendices are not covered, but this is no loss).

Apart from the book's obvious value in terms of content, it is a masterpiece of typesetting, printing and design: not design for design's sake, but design for ease of use. I suspect that the original plan was to produce the text in two (or more) colours. This leads to my only criticism, but one that is hardly worth mentioning: species names heading the accounts in the main sections are in grey, not bold black or a colour. Thus, they don't catch the eye quite as well as I feel they should, but this is a very minor criticism.

Graeme Backhurst

references at the end of a paper or short communication: authors' family names followed by a comma, then initials, each followed by a full point (= full stop, period); **names of journals:** to be given in full; **books:** after author(s), year of publication and title give the town followed by the publisher. Examples:

Ash, J.S. 1993. Changes to the Somalia check-list. *Scopus* 17: 26–31.

Moreau, R.E. 1972. *The Palaearctic–African bird migration systems*. London: Academic Press.

Two copies of contributions, which will be acknowledged, should be typed/printed in double spacing on one side of the paper only, with wide margins all round. Clear hand-written MSS will also be considered. Both English and scientific names of birds should be given when the species is first mentioned, thereafter only one name should be used. The names should be those of a *stated work* and any deviations from this work should be noted and reasons given. Contributions on floppy disk are welcomed, but please still send two hard (= paper) copies.

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This normally forms the third issue of *Scopus* each year. Records from Kenya, Uganda and Tanzania are welcomed. Please send them as soon as you can to D. A. Turner, Box 48019, Nairobi.

Records of rare birds are assessed by the internationally-based East African Rarities Committee. If you see a rare bird, it may help to telephone one of the OSC members so that someone else can see the bird.

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Continued inside back cover

Scopus 19: 65–68, March 1997

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Observations at the nest of the Blue-headed Bee-eater *Merops muelleri*

Thomas M. Brooks and Joseph N. Kirathe

The attractive Blue-headed Bee-eater *Merops muelleri* is poorly-known throughout its rainforest range from Mali to Zaïre, with an outlying population in East Africa in the forests of Kakamega, South Nandi and Mt Elgon, western Kenya (Fry *et al.* 1992). Only four nests have been described, three from Cameroon, from mid-January, late January and February (Fry 1984), and one from Gabon (Fry *et al.* 1992). For East Africa, Brown & Britton (1980) note one definite breeding record (in March) and two possible records (in April and May). *M. muelleri* did not appear to be breeding in Kakamega in May 1995 (Njoroge 1995).

We made observations at the nest of a pair of *M. muelleri* in Kakamega Forest Reserve from 10 to 21 February 1996, in the finger of degraded primary forest along the main entrance road north of the Kenya Wildlife Service office. This period appeared to be the peak breeding season for this species, for two other pairs were also observed: one in the canopy in the 'Zimmerman Grid', in the Isecheno Nature Reserve, on 16 February; and another in the finger of forest along the main entrance road (just north of the entrance to the Litali Trail). This last pair was observed taking food to a nest-hole on the ground approximately 10 m west of the road on 14 February, and by 15 February they had reportedly fledged three young. A further single individual was seen on the Litali Trail on 10 February.

Nest description

The nest of the pair observed was in a tunnel in the ground, in soil raised around the roots of a large tree (height 20 m; dbh 50 cm). It was only 100 m into the forest, and only 3 m east of the main entrance road to the Forest Reserve. The nest hole was 5 cm in diameter, and 50 cm above the surrounding forest floor. It faced east, away from the road. Its depth is unknown. The previously described nests of the species have similarly been in holes in the ground: in a sawyer's pit; in wayside banks; and in a burrow by a forest path (Fry *et al.* 1992).

Foraging success

We collected foraging data over ten (unequal) periods for a total of 10 h (Table 1). The species is sexually monomorphic and we could not distinguish individual birds, so we pooled data for both members of the pair. Often, one of the pair would retire into the canopy east of the road (presumably to forage for itself), and so the absolute totals of sallies and catches per pair are probably incomplete. When foraging for food to take to the nest, the birds would generally sally from a branch of a small sapling, 2 m high and 2 m north of the nest hole. They always returned to this branch (which was in full view

of the road, from where we made our observations) for 30 to 60 s, possibly to scan for potential nest-predators, before visiting the nest. We are confident that these data are complete.

Table 1. *Foraging success of a breeding pair of* M. muelleri. *The figures in brackets are per hour, with standard deviations given for the totals per hour*

Period	Sallies	Catches	Nest visits
14 February, 12:30–14:00	41 (27)	21 (14)	16 (11)
14 February, 18:00–18:30	3 (6)	3 (6)	3 (6)
15 February, 09:30–10:30	29 (29)	10 (10)	9 (9)
17 February, 17:00–18:00	37 (37)	23 (23)	13 (13)
18 February, 08:00–09:00	18 (18)	9 (9)	9 (9)
19 February, 15:45–17:00	12 (10)	9 (7)	8 (6)
20 February, 12:30–13:45	30 (24)	15 (12)	11 (9)
20 February, 16:45–17:15	10 (20)	10 (20)	6 (12)
21 February, 09:15–10:30	28 (22)	17 (14)	12 (10)
21 February, 14:45–15:30	23 (31)	14 (19)	10 (13)
Total	231 (23 ± 9)	131 (13 ± 6)	97 (10 ± 3)

Table 1 shows that the birds had a foraging success of approximately 55 per cent. Prey caught but not taken to the nest were eaten by the birds themselves. Since the data on number of catches are not complete, we assume that the birds took a lower percentage of their prey to their nest than the data indicate (77 per cent). The birds visited the nest approximately ten times per hour, with feeding apparently trailing off at dusk (14 February, 18:00–18:30), when the birds spent most of their time in the canopy. The high foraging rate on 17 February, 17:00–18:00, was immediately after a long (2-h), heavy thunderstorm.

Prey items

The only prey items previously reported for *M. muelleri* are flies and Hymenoptera: a worker honeybee, a large fly, and a small ichneumon-fly, from a regurgitated pellet (Fry 1984), and wasps (Njoroge 1995). We recorded prey items, where possible, for each catch made by the pair.

Table 2 suggests that *M. muelleri* has a broad insect diet, similar to that found by Fry & Gilbert (1983) for the Black-headed Bee-eater *M. breweri* (another Central African rainforest species). The commonest prey caught (about 53 per cent of the diet) were unidentified flies or Hymenoptera, at least one-third of which were eaten by the birds themselves. Lepidoptera (23 per cent) also made up a significant proportion of the diet. The larger prey items caught were generally taken to the nest. There did not appear to be a time-of-day effect on prey type caught.

On 46 occasions (35 per cent of successful captures), the birds were observed to hold the captured prey in the tip of their bill and knock it vigorously against their perch. Such behaviour has been noted (e.g., Fry 1984) as a means of dealing with stinging

Table 2. *Prey items of a breeding pair of* M. muelleri

Prey item	Total caught	% of total	Fed to young	% fed to young
Fly/Hymenoptera	53	41	34	64
Lepidoptera	30	23	24	80
Odonata	8	6	8	100
Orthoptera	5	4	5	100
Coleoptera	3	2	3	100
Unknown	32	24	23	72

insects. However, only eight of our observations were of potentially stinging insects. The other 38 cases were the butterflies and dragonflies caught, which were knocked against the perch, sometimes for up to three minutes, in order to break off their wings before they were taken to the nest. On one occasion a butterfly was caught and knocked against the branch for 1 minute, but then managed to escape (this case was not counted as a successful capture).

Other observations and discussion

As noted by Fry (1984), the birds, when perched, continually pumped their tails back and forth through a small arc. The birds were silent throughout, and, although they occasionally perched on the same branch together (generally facing the same direction—towards the road), no direct interactions between them were seen. Also, no interspecific interactions were noted.

Fry (1984) observed a pair of males courtship-feeding a female in Kakamega, and speculated that the species breeds, on occasion, in trios, with the third bird as a helper-at-the-nest. However, we observed no evidence of this during our time in Kakamega. Records from May 1995 and April and May 1996 were also of pairs only (Njoroge 1995, Imboma *et al.* 1996), but a group of six birds, including two juveniles, was seen on 16–18 August at Isecheno (Imboma *et al.* 1996). Our observations (and observations of juvenile birds in Kakamega at the end of April and the beginning of May, Imboma *et al.* 1996) support the suggestion by Brown & Britton (1980) that in Kakamega the breeding season of *M. muelleri* coincides with the end of the dry season.

On several occasions small boys were seen throwing and catapulting stones at the bee-eaters (and also at other birds and at monkeys), without success. On questioning, they claimed variously that they wanted to eat the birds, or that they just wanted to hold them. Although the population of *M. muelleri* in Kakamega may only be a few hundred individuals (Fry *et al.* 1992), and although such persecution is undoubtedly illegal and should be discouraged, it is unlikely to pose much of a threat to the birds. Considerably more serious must be the continued grazing and trampling by cattle throughout the forest, which may significantly reduce the breeding success of ground hole nesters such as *M. muelleri* if the birds, as observed in this case, nest near to open areas.

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Distribution and habitat use of Crested Larks *Galerida cristata* at Loiyengalani, Kenya

Leon Bennun, Luca Borghesio, Luca Biddau, Edward Waiyaki and Luc Lens

The Crested Lark *Galerida cristata* is a widespread and polytypic species (Cramp 1988). In Africa, the bird ranges widely to the north and south of the Sahara, along the Nile Valley, and—the race *somaliensis*—in northern Kenya, southeastern Ethiopia, and northern Somalia (Keith *et al.* 1992). In Kenya, Crested Larks are common in sandy semi-desert in the northwestern quarter of the country (Lewis & Pomeroy 1988). The species is considered mainly resident (Cramp 1988, Keith *et al.* 1992). In Europe, family units persist until autumn (Dolgushin *et al.* 1970) and movements away from the natal area involve wandering juveniles (Labitte 1957). Few data are available on Crested Lark densities and distribution patterns outside the breeding season. Scattered observations mainly involve single individuals or small flocks (Abs 1963, Kozlova 1975, Viulleumier 1979). Temporal aggregations and short-distance movements are assumed to be related to bad weather (Porter *et al.* 1969), abundant food supply (Cramp 1988) and/or water supply (Rustamov 1958).

In this paper, we (i) introduce a new census technique, specially designed for standardized counts of ground-dwelling passerines in arid areas, and (ii) analyse non-breeding population densities and spatio-temporal distribution patterns of Crested Larks in relation to the characteristics of semi-desert habitat near Loiyengalani, Lake Turkana.

Study area and methods

Lake Turkana, 250 km long and reaching the Ethiopian border along its northern end, is the largest of the lakes in the Kenyan Rift Valley (Hughes & Hughes 1992). The region is characterized by extreme dryness (<200 mm annual rainfall, peak March–April) and is often subject to long periods of drought (Hopson 1982). Temperatures are high, with mean maxima over 32°C (Hopson 1982); during our study in February 1992, maximum daytime temperature ranged from 35 to 39°C. With these climatic features, the region can be considered a semi-desert (Pratt *et al.* 1966).

Our study area was in the southeastern part of the basin, close to the fishing village of Loiyengalani (2°46N, 36°43E). We censused Crested Larks along a stretch of shoreline some 3.2 km long, and inland to some 3 km from the lake. Most of this area consisted of large sand plains with sparse, scattered vegetation and variable amounts of pebble and rock. *Acacia tortilis* is the dominant tree, with Doum palm *Hyphaene compressa* and thickets of *Salvadora persica* growing around springs and along dry riverbeds. Meadow-like *Sporobolus spicatus* grass covers a belt some hundreds of metres inland from the lake, petering out as one moves further away from the shore.

Crested Lark populations were sampled between 14 January and 18 February 1992, using a specially-designed technique that we termed a circular-plot count (CPC). To perform a CPC, one observer stands stationary holding the end of a stretched string 56.4 m long (i.e., the radius of a 1-ha circle). The other walks around in a circle holding the opposite end. Birds are flushed or observed as the string passes over them, and all the birds seen inside the circle are recorded by the central observer. We carried out 78 CPCs in 50 different plots. For each CPC the following parameters were recorded: date, time of day, percentage of terrain covered by grass/pebbles, and distance from

human dwellings/lake (estimated to the nearest 10 per cent, with the aid of a map (HMSO, 1977) where appropriate).

Results

Table 1 shows the results of a Poisson regression model, selecting the best predictors of the number of birds observed in the different CPCs. The parameters of the model were estimated by maximum likelihood, which provides a convenient index of goodness-of-fit of a model including a particular set of parameters. Variables included in the model were date (10 different sampling days), period of day (morning: 07:00–11:00; mid-day: 11:00–15:00; evening: 15:00–19:00), percentage of terrain covered by grass, percentage of terrain covered by pebbles, distance from human dwellings and distance from the lake. We used a stepwise backward procedure in the statistical program GLIM (NAG 1986) to select a final model containing only significant parameters. In the final model, period of day and percentage of terrain covered by grass significantly affected the number of birds observed, with period being the strongest predictor.

Table 1. *Poisson regression model selecting parameters which best predict the number of birds per CPC. All parameters are tested with a stepwise backward procedure, calculating the change in* χ^2 *(approximately equivalent to scaled deviance) when a parameter is excluded from the model.* *, $P < 0.05$

Parameter	$\Delta\chi^2$	Δdf	P
Percentage pebbles	0.58	1	0.45
Distance from habitation	1.54	1	0.21
Distance from the lake	1.88	1	0.17
Date	15.35	9	0.08
Percentage grass cover	4.04	1	0.04*
Period of day	13.89	2	0.001*

Selected model: $G(x_i) = 0.35 (\pm 0.21) + 0.008 (\pm 0.003)$ grass cover - $0.44 (\pm 0.26)$ period of day.

The percentage of grass cover was positively, though weakly, related to number of birds per CPC ($n = 78$, $r = 0.215$, $P = 0.059$). To examine the effect of period of day on the number of birds per CPC in more detail, we selected 14 plots for which CPS were made in all three periods. The number of birds per CPC markedly decreased from morning to mid-day, and increased again from mid-day to evening, leaving no statistical difference between morning and evening (Repeated measures ANOVA: $F_{2,26} = 5.02$, $P = 0.014$; Fig. 1).

The presence of human dwellings did not tend to affect the distribution pattern of Crested Larks. However, our CPC technique could not be applied within villages. We often observed Crested Larks gathering around shops or houses were food was available, and densities could have been high.

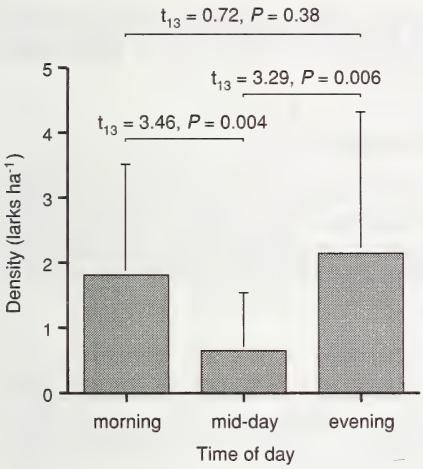

Figure 1. *Mean number of Crested Larks per plot, estimated with the circular plot count technique, in 14 plots counted in each period of the day. The* P*-values shown correspond to single paired t-tests*

The mean overall density of birds (individuals ha^{-1}) during the course of the day, estimated through CPCs, was 1.45. In the selected Poisson model, distance from the lake did not significantly affect the number of birds per CPC. However, higher densities were recorded in a belt of 100 m from the shore compared to further 'inland', although only during the morning period (Two-way ANOVA: factor Period, $F_{2,72}$ = 3.64, P = 0.031; factor Distance from Lake (<100 m versus >100 m), $F_{1,72}$ = 12.94, P = 0.001; two-factor interaction, $F_{2,72}$ = 2.68, P = 0.07).

Discussion

Crested Larks are the commonest passerines around Lake Turkana. If both the overall density observed in the course of our study (1.45 individuals ha^{-1}) and the habitat structure are similar to those found in other parts of the region, we can estimate that in an area of 2000 km^2 (i.e., a belt of about 4 km extended all around the shores of the lake), the population amounts to about 300 000 individuals. This very tentative estimate could be improved by carrying out additional counts in other areas. The CPC technique would be appropriate for this, and for censusing other ground-dwelling passerines in open habitats. It proved easy to perform, and appears to give consistent and accurate results.

CPCs carried out at different distances from the lake suggest a circadian pattern of movement between the lakeshore and the surrounding areas. Our results suggest that the birds were concentrated along the lakeshore during the early morning hours. Some of these birds apparently scatter inland during the day. During the hottest hours, when CPC numbers were at a minimum, the birds may concentrate around dwellings, in the shade of rocky cliffs, or at favoured drinking sites around springs or standpipes. We observed concentrations of birds at all these types of sites, but they are difficult to census with the CPC technique. One lark, captured and ringed at a drinking-site, was

later observed feeding 1 km away, so movements could be substantial. The afternoon appears to see the larks feeding in the open again as they begin a generalized movement back towards the lakeshore.

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An ornithological visit to the Rubeho Mountains, Tanzania

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This study is part of the Eastern Arc Biodiversity Programme of the Danish Centre for Tropical Biodiversity. It aims to describe and analyse biogeographic patterns in East African forest mosaics, particularly those of the Eastern Arc Mountains. These mountains, composed of old crystalline rocks and under the direct climatic influence of the Indian Ocean (Lovett 1988, Lovett & Wasser 1993), stand out as the biologically most unique part of the Tanganyika/Malawi Mountain Group (Moreau 1966).

Data are presented here from the first ornithological survey of the Rubeho (Usagara) Mountains which, together with the lower Uvidunda Mountains, form a large fault block west of Mikumi National Park between the Great Ruaha and Gombo rivers (Fig. 1). The only other ornithological records we know of from this area are two turaco specimens (see below) collected in 1923 by Arthur Loveridge, and labelled "Madizini", which is a small village in the foothill zone.

The Rubehos are isolated from the species-rich Udzungwa Mountains only by the narrow semi-arid Ruaha Gorge, and the Uvidunda/Rubeho block would appear to form a link between the Udzungwas and the more isolated Ukaguru, Nguru and Nguu mountains to the northeast. The Nguru Mountains are relatively well studied (see, for example, Stuart *et al.* 1993). The Ukaguru avifauna was described by Friedmann & Stager (1964) and Evans & Andersen (1993), and results from a survey of the Nguus were given by Seddon *et al.* (1995).

Most parts of the Rubeho highlands are covered in montane grassland. This area is generally uninhabited and only rarely visited by villagers. In the southeast, just north of the Great Ruaha Gorge near Mwega, there are some humid forest patches on the steep slopes of the Uvidundas, and in the northern part of the highlands, more than 100 km^2 of evergreen forest are found in the Ukwiva Catchment Forest Reserve, between 1800 and 2050 m. Isolated and much smaller forest patches are found on Mt Pala Ulanga (1625 m) near Mikumi National Park, and on Mt Lugunga (2357 m) northwest of Ukwiva. Because of a slight rainshadow effect from the Uluguru Mountains, the climate in this area is not very humid. However, we would expect an annual rainfall greater than 1000 mm in the mist zone on the eastern scarp of the highlands.

The lack of biological data from the Rubeho Mountains can be attributed to difficult access. From the east, the old road from Kilosa and Ulaya is broken up, and neither this road nor a newer road from Mikumi to Kisanga, reach the highlands. The only access by road is from the west (Malolo). A botanical team using the western route reached the highlands and found woodland and secondary montane forest over old cultivation at between 1600 and 1700 m (Lovett & Minja 1990). Hardly anybody from the nearest villages seems to have visited the montane forest along the eastern scarp. In this area the forest can be reached only on foot by ascending steep slopes from 600 to 1800 m

Figure 1. *Overview map* (right) *and a detailed map* (left) *of the Udzungwa–Uvidunda–Rubeho area, showing localities mentioned in the text. Mountains are indicated and montane forest stippled*

through *miombo* woodland and tall grassland. Because of the remoteness of the eastern highlands, we expected to find undisturbed humid forest along the escarpment.

As will appear in the following account, the Rubeho mountain forests were ornithologically disappointing because habitat disturbance by elephant and buffalo has strongly influenced forest structure. The degraded forests are thus open to invasion by ubiquitous species and the bird community appears to lack several of the 'good' Eastern Arc forest birds. On the other hand, the forests are an interesting example of the role of natural habitat disturbance in shaping the biota of East African montane habitats.

Itinerary and Habitats

We visited the Kisanga–Madizini area, 9–25 September 1993, arriving at Kisanga via the road from Mikumi. Madizini (7°12S 36°30E, 600–700 m) is a well-watered area at the base of the mountains with marshy plains partly converted to rice fields and sugarcane plantations. Low hills are covered in semi-arid scrub (strongly degraded by burning). The area 2–5 km SW of Madizini (where the road system is interrupted) has a mosaic of woodland and semi-deciduous lowland forest dominated by riverine species. In September, the forest floor was dry but low-lying areas had a tall undergrowth of *Aframomum* sp. This area was the main focus of our study. However, between 18 and 23 September, the first author (together with T. Msangi from the Tanzania Forestry Research Institute and a local guide, Mzee Kapita), visited the highlands in the southern part of the Ukwiva Catchment Forest Reserve near the Yovi River (6°55–7°20S, 36°10–20E, 1700–2050 m).

The foothills and highlands had numerous buffalo trails. According to rangers in Mikumi National Park, a large proportion of the buffalo population found there moves west to Kisanga and up into the Rubeho Mountains during the dry season. Until 20 years ago this was also an important migration area for elephants and there is still a resident population in Ukwiva forest. These large mammals have had a conspicuous effect on the highland vegetation.

Lowland forest

Altogether, *c.* 4 km^2 of lowland forest is probably the only vestige of this habitat left in the area. Although most large timber-trees (*Khaya anthotheca*, *Milicia excelsa*) have been extracted, an almost closed canopy was found along the streams. Other trees found were *Afzelia quanzensis*, *Albizia* sp., *Aningeria adolfii-friedericii*, *Bersema abyssinica*, *Draceana usambarensis*, *Kigelia africana* and *Vitex* sp., and along the streams there were some large *Ficus* spp. The forest floor was dry, but along the clear forest streams there were level areas with a tall undergrowth of *Aframomum* sp., grasses, sedges and herbs. There was also an area of partially-flooded forest. On the ridges, a more open woodland-like vegetation was found, with *Albizia* sp., *Brachystegia* sp. and *Bridelia* sp.

Hills

The lower hills (up to 1200 m) had some *miombo* woodland which was replaced by tall grass and scattered *Protea* and *Uapaca* bushes. Above *c.* 1500 m, the vegetation was lush and green, dominated by bracken and densely tangled thickets of herbs and brambles. In wet depressions there were rushes and small patches of lichen-clad *Bridelia* sp., *Myrica* sp., and *Tabernaemontana* sp. The steep eastern approach exhibited signs of annual burning, but the incidence of fire appears to be sporadic on the rolling highlands.

Montane forest

Lovett & Pócs (1993) mention only dry montane forest dominated by widespread species in the western areas of Ukwiva Forest. The southeastern part of the forest had similar vegetation, with *Albizia* sp., *Myrica* sp., *Tabernaemontana* sp., *Vitex* sp. and *Ficus* sp. At higher elevations the forest was dominated by *Parinari excelsa* and *Croton* sp. The many gaps in the forest were filled with tall herbs and vines. Habitat of this type was found as far as we could see from the ridgetops in the southern part of the forest. The human impact on the forest was negligible (one *panga*-cut seen in four days) but signs of trampling and bushes tossed around by elephants were everywhere. By maintaining a mosaic habitat with numerous light-gaps, the elephants favour weedy species of shrubs and trees which, therefore, gradually replace species that would otherwise be expected to dominate in montane forest. Because the highlands are rarely visited by humans, we believe the main reason for the presence of large areas of lush grassland and thickets, and the poor stature and quality of the montane forest, is a result of long-term disturbance by large mammals.

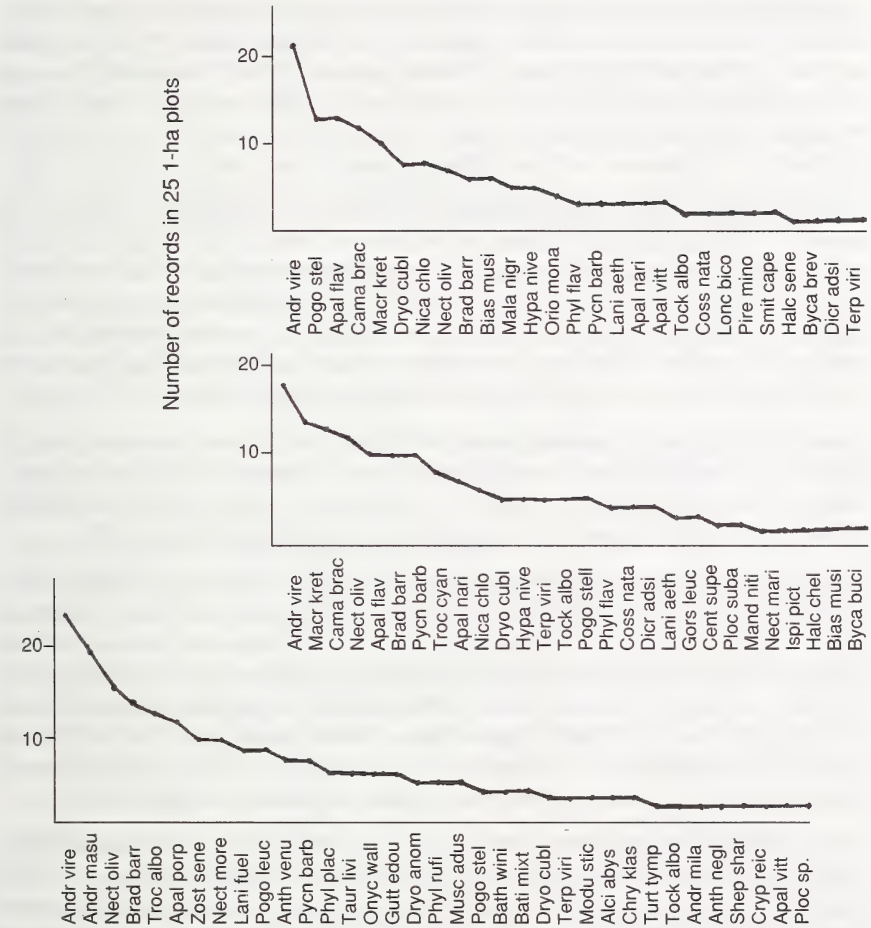
Methods

We made general observations, some mist-netting (2180 net-metre-hours (= nmh) in forest and 1344 nmh in marshy habitat at Madizini, 1800 nmh in Ukwiva forest) and Timed Species Counts (TSC) by JF in forest habitat. The method used is described by Fjeldså & Rabøl (1996). Records were taken for ten minutes (morning and late afternoon) in 25 separate 1-ha plots in each study area, recording only birds which were inside a pre-defined 1-ha area—a method almost identical to that developed for Afromontane forest birds by Koen (1988). The efficiency of mist-netting and TSC was negatively influenced by dry and sunny weather (low activity in the understorey and low song activity).

Results

Altogether 153 bird species, most of them widespread birds of bushland habitats, were recorded in the Kilosa–Madizini–Ukwiva area. Community structures, based on TSC from forest habitat, are illustrated in Fig. 2.

Among endemic species of the Tanganyika/Malawi Montane Group, we found only White-chested Alethe *Alethe fuelleborni*, Spot-throat *Modulatrix stictigula*, Sharpe's


Number of records in 25 1-ha plots
20
10
Andr vire Pogo stel Apal flav Cama brac Macr kret Dryo cubl Nica chlo Nect oliv Brad barr Bias musi Mala nigr Hypa nive Orio mona Phyl flav Pycn barb Lani aeth Apal nari Apal vitt Tock albo Coss nata Lonc bico Pire mino Smit cape Halc sene Byca brev Dicr adsi Terp viri
20
10
Andr vire Macr kret Cama brac Nect oliv Apal flav Brad barr Pycn barb Troc cyan Apal nari Nica chlo Dryo cubl Hypa nive Terp viri Tock albo Pogo stell Phyl flav Coss nata Dicr adsi Lani aeth Gors leuc Cent supe Ploc suba Mand niti Nect mari Ispi pict Halc chel Bias musi Byca buci
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Andr vire Andr masu Nect oliv Brad barr Troc albo Apal porp Zost sene Nect more Lani fuel Pogo leuc Anth venu Pycn barb Phyl plac Taur livi Onyc wall Gutt edou Dryo anom Phyl rufi Musc adus Pogo stel Bath wini Bati mixt Dryo cubl Terp viri Modu stic Alci abys Chry klas Turt tymp Tock albo Andr mila Anth negl Shep shar Cryp reic Apal vitt Ploc sp.

Figure 2. Rank-ordered species abundance curves for birds, based on samples of 25 1-ha plots studied ten minutes (see Fjeldså & Rabøl 1995). The plots were inside the main patch of lowland forest near Madizini (A), along edges between forest and swampy areas near Madizini (B) and in Ukwiva forest (C)

Akalat *Sheppardia sharpei*, Chestnut-throated Apalis *Apalis porphyrolaema (chapini)*, Mrs Moreau's Warbler *Bathmocercus winifredae*, African Tailorbird *Orthotomus metopias* and Uluguru Violet-backed Sunbird *Anthreptes neglectus*. Also, there were rather few typical forest understorey birds: Olive-flanked Ground-robin *Dryocichloides anomalus*, Sharpe's Akalat, Spot-throat, African Hill Babbler *Alcippe abyssinica* and Red-faced Crimsonwing *Cryptospiza reichenovi* in montane forest only; White-starred Forest-robin *Pogonocichla stellata*, White-chested Alethe and

Evergreen-forest Warbler *Bradypterus barratti* in highlands as well as lowlands; Pale-breasted Illadopsis *Trichastoma rufipennis*, Red-capped Robin Chat *Cossypha natalensis*, Orange Ground Thrush *Turdus gurneyi*, Peters' Twinspot *Hypargos niveoguttatus*, Green-backed Twinspot *Mandingoa nitidula* and Lesser Seed-cracker *Pyrenestes minor* only in lowland forest.

Comments on the most interesting observations are gven below.

White-backed Night Heron *Gorsachius leuconotus* One pair was observed on several occasions, and at close range, in groundwater forest on the border of an open, inundated area near the Madizini camp. Although widespread in sub-Saharan Africa, this species appears to be uncommon or at least rarely seen, and in Tanzania it is known only in the north and west. The record near Madizini, and observations in 1994 and 1995 (by P. Honess and M. Rahner) at the Ruipa river in the extensive lowland forests south of the Udzungwa scarp, are range extensions within Tanzania.

Crested Guineafowl *Guttera edouardi* Few were seen in the lowland forest, but the species was common in areas trampled by buffalo and elephants in the Uquiwa forest, 1800–2000 m. In Tanzania, this species is usually restricted to lowland and foothill forests, but it is well known from highlands in western Kenya (Britton 1980).

Livingstone's Turaco *Tauraco livingstonii* Common in the Uquiwa Forest. A bird seen very well at *c.* 10 m distance had white cheek-spots as found in nominate *livingstonii* but dark terminal spots to the white tips of the long crest feathers, as found in the form *chalcolophus* (Kenya to Hanang). In two specimens from Madizini in the Academy of Natural Sciences, Philadelphia, one had tiny dark terminal spots to the crest feathers, and both had a rather narrow white cheek-spot. This indicates a secondary introgression by the northern form, and raises doubts about the view of Dowsett-Lemaire & Dowsett (1988) that isolating mechanisms have evolved.

Bar-tailed Trogon *Apaloderma vittatum* Seen on several occasions in a dense and shady area in the Madizini Forest, 15–18 September (at 600 m, in a area where Narina's Trogon *A. narina* also occurred). Once two birds were seen together, and on one occasion a female-coloured bird was seen very well, permitting careful checking of the short bill, pinkish facial warts and the tail barring. This is the lowest altitude record of this typical montane forest bird.

Pallid Honeyguide *Indicator meliphilus* One was seen on 21 September in fairly open forest at 2000 m. There appear to be no previous records of this species between the Zambesian woodland zone west of the Malawi Rift and northern and coastal Tanzania (Fry *et al.* 1988).

Bennett's Woodpecker *Campethera bennettii* The endemic Tanzanian form *scriptoricauda* (for rank see Dowsett & Dowsett-Lemaire 1993) was seen daily in half-dead trees in the ecotone between tall grassland and woodland. It was occasionally seen in groups of up to six birds, often together with a pair of Golden-tailed Woodpeckers *C. abingoni*.

Kretschmer's Longbill ***Macrosphenus kretschmeri*** One of the commonest birds in the lowland forest canopy and edges draped with dense vine-tangles. Three specimens were collected. A few individuals were heard singing in *Tabernaemontana* groves up to 1800 m at the Yowi headwaters. This species is common in coastal forest and thickets up to 300 m and the Rubeho records thus represent a westward and altitudinal range extension. Kretschmer's Longbill was found to be uncommon in Kimboza Forest in the lowlands east of the Uluguru Mountains (JF *pers. obs.*) and in 1995 it was also found in forest habitat around the perimeter of the Kilombero Valley.

Mrs Moreau's Warbler ***Bathmocercus winifredae*** Fairly common in forest glades with densely tangled herbaceous vegetation in the Ukwiva Forest. This species was long regarded as an Uluguru endemic, but is now known to exist also in the Ukagurus (Friedmann & Stager 1964, Evans & Andersen 1993) and in Mwanihana Forest in the Udzungwa Mountains (Jensen & Brøgger-Jensen 1992).

Uluguru Violet-backed Sunbird ***Anthreptes neglectus*** Several individuals were seen at the edge of the lowland forest and in thickets at the edge of the montane forest, at 1800 m.

Moreau's Sunbird ***Nectarinia moreaui*** Fairly common in the Ukwiva Forest. One male and one female were collected. The general colouration resembled specimens from the Nguru Mountains, the belly of the male being citrine with a yellow tinge as in typical *moreaui*, but exceptionally dark. However, its breast bar was scarlet (not orange) and very broad, completely separating the yellow lateral "tufts". This supports the observations made by A. Beakbane and E. Baker that an intergradation towards *N. mediocris fuelleborni* may exist (Jensen & Brøgger-Jensen 1992). Probably a DNA-based phylogeographic study will be needed to sort out the relationships of these taxa and of Loveridge's Sunbird *N. loveridgei*.

Ploceus **sp.** An unidentified male nuthatch-weaver was seen (and sketched in the field) in evergreen forest at 1900 to 2000 m (an unoccupied nest of the nuthatch-weaver type was also seen in this part of the forest). The observed bird was a typical nuthatch-weaver by jizz and behaviour, strikingly golden yellow with darker throat. The central throat was described as blackish, grading through golden brown to the yellow breast and through olive-brown on cheeks and forehead to the yellow on the back of the head. The tail was yellow laterally. No further details could be seen. The bird appeared to differ from the Olive-headed Golden Weaver *P. olivaceiceps* (distributed from Zambia to southwestern Tanzania) by its darker mid-throat, an extension of brown colour to the forehead and by more yellowish wings and tail. Furthermore, the habitat differs from that of *P. olivaceiceps*, which is a bird of *miombo* woodland.

The nuthatch-weavers fall into two morphological groups insofar as the species are either very yellow (*P. alenius, ocularis* and *olivaceiceps*) or extensively dark above (*P. bicolor, nigricollis, melanogaster* and *nicolli*). Although this difference is conspicuous, it could have a very simple genetic basis. Therefore, a possible interpretation

would be that the Ukwiva bird represents a small isolated yellow-morph population of the otherwise dark-backed Usambara Weaver *P. nicolli*, which has an apparently relict distribution with small populations in the East Usambara (*P. n. nicolli*) and Udzungwa and Uluguru mountains (*P. n. anderseni*) (Franzmann 1983).

Streaky Seed-eater *Serinus striolatus* One bird was seen by MA on 17 September at the edge of dense forest southwest of Madizini. Yellow head-stripes, characteristic of the Udzungwa form, *S. s. whytii*, were lacking.

Discussion

The species abundance curves for rich tropical faunas are normally characterized by a few moderately common species and a long "tail" of low-density species. In Amazonian rainforest, where the number of low-density species is very high, considerable effort and several techniques are needed to find all species (see Terborgh *et al.* 1990). Considering the urgent need for ornithological data from dwindling tropical forests, rapid surveys of several localities must be prioritized over such complete inventories. For comparative purposes, it therefore becomes highly important to standardize the data-gathering and to always use the same method. Using rarefaction methods, corrections can then be made if sample sizes differ. However, such comparisons assume, *a priori*, a particular species abundance distribution, such as the log-normal (Kempton & Taylor 1974).

Standardized studies during the recent years in Tanzanian forest mosaics demonstrate an unusual species abundance curve, which is short-tailed and with a less concave shape (Fjeldså & Rabøl 1996; see also Stuart 1983, Moyer 1993, Moyer & Lovett in press). In communities of this type, accumulated curves for species observed or mist-netted level out fairly soon, indicating that the avifauna has been recorded fairly completely. Omitting the very rich Usambara and Udzungwa mountains, isolated forests of the Eastern Arc Mountains (whether large or small) have 45–50 bird species; 25-plot TSC samples typically giving 25–30 species, and mist-netting data indicating an asymptote level of *c.* 20 mist-net-prone species (Fjeldså & Rabøl 1996). The Madizini Forest agrees well with this norm (Fig. 2a, b), while the community of the Ukwiva Forest is enriched by a number of habitat generalists (Fig. 2c). As far as we could see from the hill-tops in the southern part of Ukwiva Forest, the habitat mosaic is such that Klaas' Cuckoo *Chrysococcus klaas*, Common Bulbuls *Pycnonotus barbatus*, Black-backed Puffbacks *Dryoscopus cubla*, Variable Sunbirds *Nectarinia venusta*, etc., may be expected to exist throughout this large forest tract. Thus, although the community of genuine forest birds is quite poor, the total species richness may be considerable, and a large effort will be needed to find all the species.

Dranzoa (1995) describes a similar situation for Kibale Forest (Uganda), of which large parts are selectively logged with patches of intact canopy. She considered that the logged parts of Kibale Forest are unlikely ever to recover (and support a typical forest bird community) without the exclusion of elephants.

Our survey data indicate some possible distribution gaps. The only *Apalis* warblers

found were Yellow-breasted *A. flavida* (lowlands) and Chestnut-throated Apalis *A. porphyrolaema* (montane forest); thus, Bar-throated *A. thoracica*, Brown-headed *A. alticola* and Black-headed *A. melanocephala* are missing. The Iringa Akalat *Sheppardia lowei* is recorded from the Udzungwa and Ukaguru Mountains (possibly different subspecies according to Stuart *et al.* 1993), but were neither heard nor mist-netted in what appeared to be suitable habitat in the Rubeho Mountains. It was also remarkable that we recorded no barbets at all in the lowlands and foothills, and only Moustached Green Tinkerbird *Pogoniulus leucomystax* in the high parts (where it was common). The Drongo *Dicrurus adsimilis* was common in the foothills but we did not find Square-tailed Drongo *D. ludwigii* (a common species in foothills and submontane forest on adjacent mountains). Similarly, Dark-backed Weaver *Ploceus bicolor* (which usually follows Square-tailed Drongo in mixed-species foraging flocks) was absent. In the lowland forest, the Little Greenbul *Andropadus virens* was common, and a few calls of Yellow-streaked Greenbul *Phyllastrephus flavostriatus* were heard, but we missed such common species as Fischer's Greenbul *P. fischeri* and Yellow-bellied Greenbul *Chlorocichla flaviventris*.

While the total species richness is fairly constant in Eastern Arc forests, the number of forest specialists, and restricted-range species in particular, varies much between mountains (Fjeldså & Rabøl 1996). Thus, only two Red Data Book-listed species were found in the Rubehos: Mrs Moreau's Warbler and Moreau's Sunbird (compared with ten in the adjacent eastern part of the Udzungwa Mountains). Mrs Moreau's Warbler is typical of disturbed areas within forest, such as dense herbaceous vegetation in landslide areas and other large light-gaps (Collar & Stuart 1985). This bird may probably be favoured by the habitat disturbance caused by elephants.

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Field observations on Prince Ruspoli's Turaco *Tauraco ruspolii*

Luca Borghesio

Although the Musophagidae are among the most characteristic birds of tropical Africa, they have received very limited attention from ornithologists, and little information is presently available on their biology in the field.

The need for field observations is particularly pressing for those species whose survival is at risk. One of these is Prince Ruspoli's Turaco *Tauraco ruspolii*, an endemic of the southern Ethiopian Highlands with a very restricted range, probably not larger than 5000 km^2. The species is currently considered Endangered in the IUCN criteria (Collar *et al.* 1994), but owing to difficulty of access and security problems in the area, it has never been studied in detail.

In this paper I report some data on the biology of *T. ruspolii*, collected during an expedition to south Ethiopia in spring 1995 and discuss them in the light of present knowledge of the genus *Tauraco*.

Study area

Observations were carried out in the Ethiopian administrative provinces of Bale and Borana, within the presently known range of *T. ruspolii*. Elevation in the area ranged between 1200 and 2000 m.

Owing to elevation, temperatures in the study area are not high, with annual means between 18° and 21°C. Rain falls in two separate rainy seasons (in April and October), and annual rainfall averages 700 mm, with some variation in different areas owing to altitude and exposure to rain-carrying winds (Wolde-Mariam 1969).

The main habitat is woodland dominated by *Acacia abyssinica*, *A. seyal*, *A. brevispica*, *Dichrostachys cinerea* and *Terminalia brownii*; figs (*Ficus sycomorus*, *F. thonningi*, *F. vasta*) are also common.

Northwards, woodlands grade into a much wetter forest habitat, where the dominant tree is *Podocarpus gracilior*. These forests are the northern limit of distribution of *T. ruspolii*, which is usually replaced inside them by the related species *T. leucotis* (Borghesio, in press).

Near the villages of Neghelli (5°20N, 39°35E) and Arero (4°45N, 38°49E) a different vegetation occurs, dominated by *Juniperus procera*; and in Arero, junipers form a true forest habitat, which, however, only extends over a small area (probably no more than 25 km^2); elsewhere they grow sparser and are mixed with species coming from the adjoining woodlands.

Methods

Observations were carried out between 23 March and 6 June 1995, during daytime, from 6:30 to 18:30. Data were recorded opportunistically after making sure that the birds had not been disturbed or influenced in the execution of their behaviour. Three main activities were observed:

– feeding: individuals observed pecking or swallowing a food item;

– resting: individuals perching in a fixed position for at least two minutes, even if engaged in preening or other comfort activities;
– calling: individuals vocalizing from a fixed position.

Birds could be alone or in groups. A group was formed by individuals observed on the same tree or on nearby trees, but moving in the same direction in a co-ordinated way or performing the same activity.

The day was divided into six 2-h periods and the distribution of the observations and of activities was checked with χ^2 tests against the null hypothesis that they did not vary over the day, assuming that the number of hours of fieldwork in each period represented the expected distribution of the data. When data were not enough to permit statistical analysis, adjacent periods were merged.

Plant species were determined using Hedberg & Edwards 1989, Noad & Birnie 1989 and Bekele-Tesemma *et al.* 1993.

Results

Vocalizations

Four different vocalizations were recorded. These were:

1. the "main" call (= song), with probable territorial function;
2. a soft contact call uttered by birds on the move;
3. a growling call, with probable long-distance contact function;
4. a stress call.

The main call clearly resembles that of other *Tauraco* species (Dowsett-Lemaire & Dowsett 1988, Fry *et al.* 1988) in its general features. It is composed of an introductory clucking note, lasting about one second, and followed by a sequence of about ten low-pitched *kuk* sounds uttered at a speed of 2–3 s^{-1}. The song of *T. leucotis*, although similar, is easily distinguished in the field as it is clearly louder and more croaking in its intonation.

The song of *T. ruspolii* is not frequent, and it was heard on only eleven occasions during the survey. Singing birds were usually hidden inside the foliage of trees and difficult to locate. As is common in the Musophagidae (Candy 1984, Fry *et al.* 1988, Decoux & Erard 1992), the call of one bird often stimulated the answer of up to two others near by. On one occasion, at Wadera (5°45N, 39°20E), in a *Podocarpus* forest where *T. leucotis* was much more abundant than *T. ruspolii*, the song of the first species triggered that of the second.

Two different calls had a probable contact function. The first was a soft *crrr*, about one second in duration, probably corresponding to the soft *chirrr-cha* reported by Benson (1945). This was regularly uttered while moving among the branches, and probably permitted individuals in a couple or a group to keep close to each other; this call, although audible only at short distances, often allowed the detection of birds that would have otherwise gone unnoticed.

The second contact call was a coarse, loud growl, 1–2 s in duration, usually repeated several times for up to 30 s and in a chorus with other individuals responding from nearby. Birds engaged in these vocalizations were usually sitting in hidden positions among tree foliage. The probable contact function is suggested by the short duration of these choruses, in which all the birds called simultaneously, while responses determined by the "main" call were spread over some minutes. Apparently, there was some variation in these growling calls in different parts of the range of *T. ruspolii*: At Wadera, they were indistinguishable from the calls uttered by *T. leucotis*, and on at least two occasions, in the *Podocarpus* forest north of the village, individuals of the two species participated in the same chorus. At Arero, where *T. leucotis* was not present, the calls were shorter in duration and less coarse in timbre.

The last vocalization was a sudden shriek, of very short duration, given as a sign of fear, usually when a person unexpectedly appeared near a bird.

Diet

T. ruspolii seems to feed largely or perhaps completely on fruit. Various other species of turacos have been reported to rely partly on animal food (insects), especially while raising young (Jarvis & Currie 1978, Fry *et al.* 1988), but *T. ruspolii* was never observed to do so, although this possibility is not ruled out, since breeding individuals were not observed during the survey.

Table 1. *Food plants of* Tauraco ruspolii

Species	Family	Fruit diam (cm)	Fruit colour	Habitat
Podocarpus gracilior	Podocarpaceae	2.0	green	*Podocarpus* forest, forest margins
Juniperus procera	Cupressaceae	0.5	green	*Juniperus* forest
Ficus sycomorus	Moraceae	2.0	brownish	woodland
Ficus vasta	Moraceae	1.5	green/yellow	*Juniperus* forest, woodland
Ficus thonningi	Moraceae	0.8	green	*Juniperus* and *Podocarpus* forests, forest margin, woodland
Vepris dainelli	Rutaceae	2.0	orange	*Podocarpus* forest, forest margin
Teclea sp. (prob. *simplicifolia*)	Rutaceae	0.5	green	woodland
Syzygium guineense	Myrtaceae	1.0	purple	riverbanks
Cordia africana	Boraginaceae	1.0	yellowish	cultivated at Arero
Acokanthera schimperi	Apocynaceae	1.5	yellowish	*Juniperus* forest, forest margin

Table 1 lists ten plants on which *T. ruspolii* was observed to feed, with the habitats where they were found and information on the size and colour of the fruit. Fruits varied widely both in colour and in diameter; it is remarkable that many of them were green, thus confirming that this colour is by no means avoided by turacos (Dowsett-Lemaire 1988). Fruits were always swallowed whole, and this possibly sets the upper limit of their diameter.

Figs (*Ficus* spp.) and the two conifer species (*Juniperus procera* and *Podocarpus gracilior*) probably represented the most important food plants (Fig. 1): these three species totalled 74 per cent of feeding observations ($n = 81$) and single individuals or groups up to eight were often observed to feed on these trees, sometimes spending the whole day in or close to them. Table 1 lists also *Acokanthera schimperi*, the "poison-arrow tree"; feeding by *T. persa corythaix* (the Knysna Lourie or Turaco) on the related *A. spectabilis* and by *T. hartlaubi* on *A. longiflora* has already been reported (Jubb 1965, Fry *et al.* 1988), and judged extraordinary, based on the supposed poisonousness of these fruits; however, the ripe fruits of *A. schimperi* are not poisonous, and are habitually eaten by humans (Bekele-Tesemma 1993), thus there is no reason to suspect that *T. ruspolii* possesses any particular ability to tolerate vegetal poisons.

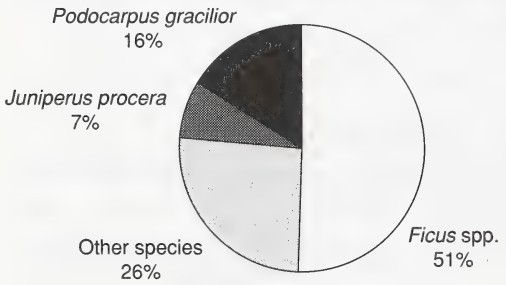

Figure 1. *Food plants used by* Tauraco ruspolii *(percentage of overall feeding observations)*

T. ruspolii is able to exploit new food sources, when they become available; this is suggested by the birds observed on 2 June 1995 feeding on a large *Cordia africana* growing in the vicinity of the village of Arero. This tree was cultivated and the species is not reported from elsewhere in the area (Haugen 1992), although it grows in the forests situated about 100 km northwards, where *T. ruspolii* is still found.

The list of Table 1 is probably far from complete, since during the survey individuals of *T. ruspolii* were observed on various other unidentified trees and shrubs bearing fruits on which they were probably feeding.

General behaviour and daily activity rhythm

A total of 188 *T. ruspolii* were observed during this study; of these, 77 (41 per cent) were solitary and 111 (59 per cent) in groups of 2 to 8 individuals (mean 2.8±1.4,

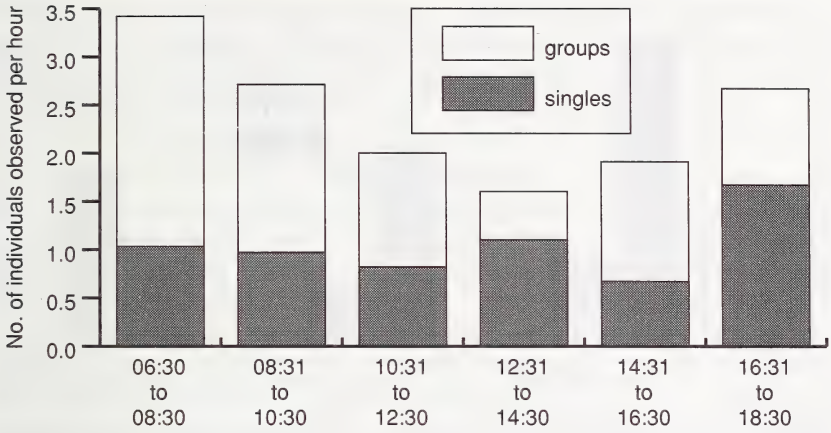

Figure 2. *Numbers of* Tauraco ruspolii *observed during different 2-h periods*

median 2). Figure 2 shows the variation of the mean number of individuals met with during the day, calculated as the number of individuals observed in each 2-h period divided by the number of hours of fieldwork in that period. The number of individuals observed varied significantly during the day ($\chi^2 = 11.4$, $n = 188$, d.f. = 5, $P = 0.047$) and there was a marked decrease in the middle hours: this was mainly related to groups, which showed highly significant changes, while observations of single individuals did not (for groups, $\chi^2 = 18.6$, $n = 111$, d.f. = 5, $P = 0.002$; for singles, $\chi^2 = 5.3$, $n = 77$, d.f. = 5, $P = 0.37$).

In the first part of the day, from 6:30 to 12:30, groups averaged 3.1±1.6 individuals, while in the following hours, from 12:31 to 18:30, the mean group size dropped to 2.3±0.5; this difference, however, was not significant (Mann-Whitney, U = 118, two-tailed, $P = 0.13$), since median and modal dimensions of the groups did not differ, being 2 in both cases. Changes in mean values were therefore related to regular observation of groups of 4 to 8 individuals at the beginning of the day, this causing a significantly larger range of variation in the size (and a consequently higher standard deviation) of the morning groups than in those of the rest of the day (Moses test of extreme reactions, $n_1 = 27$, $n_2 = 12$, $P = 0.001$). These large groups were probably associated with feeding activity.

Figure 3 shows the distribution of the three main activities within the day. Feeding had a strong peak in the morning and decreased in later hours ($\chi^2 = 10.8$, d.f. = 2, $n = 81$, $P = 0.004$); feeding individuals could be observed throughout the day, as reported for other species (Jarvis & Currie 1979, Fry *et al.* 1988), but most of the food was certainly taken in the morning, when the turacos often congregated on a single large fruiting tree, which was usually exploited for several days. Vocal activity was at its maximum at the end of the day, and reached a minimum around midday ($\chi^2 = 6.4$, d.f.

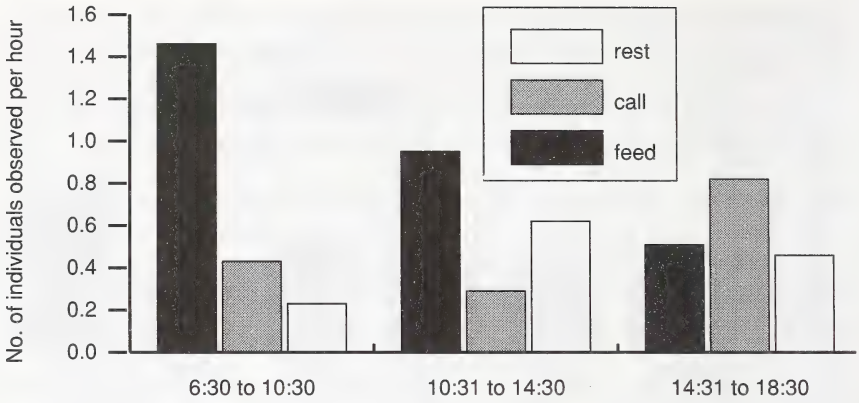

Figure 3. *Diurnal activities of* Tauraco ruspolii *observed during different 4-h periods*

= 2, $n = 37$, $P = 0.04$), while resting had a small peak (not statistically significant) in the middle hours ($\chi^2 = 5.2$, d.f. = 2, $n = 30$, $P = 0.07$); variations in resting activity were probably underestimated owing to the clearly lower detection rate of birds in the middle part of the day (cf. Fig 2).

Few other activities were observed during the survey and no statistical analysis was attempted on these, owing to the small size of the sample.

At Wadera, one *T. ruspolii* was observed on the same tree with a *T. leucotis* in a *Podocarpus* forest habitat; the two birds had raised crests and were possibly engaged in aggressive behaviour, but this could not be confirmed with certainty since they flew off immediately after they had been spotted.

On a few occasions, usually in the morning between 7:30 and 10:00, the birds engaged in sudden pursuits, with one individual running along branches or flying to nearby trees and another following it closely; this behaviour did not seem to be a form of aggression as it never resulted in physical contact between the individuals performing it; moreover, when the pursuit ended, the birds usually remained together in the same tree or on the same branch, showing no sign of stress. The meaning of this behaviour is not clear; I also observed it in *T. leucotis*.

Breeding

During the survey no nest of *T. ruspolii* was found. However, some information was obtained from local people, who usually knew the species quite well, and called it *wayuwaro* in the Borena language, a name used also for *T. leucotis*. At Sokora (5°37N, 39°18E) and Arero, where *T. leucotis* was not present, thus avoiding possible confusion, many local people agreed that the nest of *T. ruspolii* was "cup-shaped, similar to that of a pigeon" and contained "one or two whitish eggs". All the informers

said that this nest was very rarely found, because it was invariably well hidden in the trees. One other informer, on 22 May, claimed having observed an occupied nest of *T. ruspolii* about a week before, at a locality about 15 km north of Arero; I was not able to visit the place to confirm the record.

Local movements

In contrast to most other species in this family (Moreau 1958, Fry *et al.* 1988), *T. ruspolii* seems not to be a completely sedentary species, and some data suggest the existence of small-scale movements. This evidence derives mainly from repeated visits to the same localities.

At Sokora, during three visits (25 March, 14–15 and 22–23 April) numerous individuals were easily observed in the woodland surrounding a small river and up to about 4 km east and west of it. On a fourth, later visit, on 27–28 May, none was found away from the river; only five birds were seen, after a lengthy search, all of them feeding on a large *Ficus thonningi* growing a few metres from the water.

About 3 km east of Bobela (4°50N, 38°52E), in a woodland adjoining *Juniperus* forest, three *T. ruspolii* were recorded in a 2-km transect on 28 March. Two months later, on 1 June, the same locality was searched for one full morning, covering no less than 10 km, but no turaco was seen. On the other hand, inside the *Juniperus* forest, 2 km west of the village, *T. ruspolii* was observed on both visits. At Wadera, in an area of better rainfall than Bobela and Sokora, *T. ruspolii* was observed on many occasions between 22 March and 26 May, in the *Podocarpus* forest and in the transitional habitat where woodland and forest abutted.

The possibility that *T. ruspolii* is not completely sedentary was also confirmed by local informers in the area of the river Awata, west of Hare Kelo (5°33N, 39°24E), where the species was said to be very common during the dry period of the year, but becoming much rarer during the rains.

These observations suggest that *T. ruspolii* may regularly perform short-range movements, of probably no more than a few kilometres from the wetter habitats (forests, forest margins, riverine formations) where it appears to be recorded throughout the year, to the drier woodlands surrounding them.

Discussion

Most of the information on *T. ruspolii* in the present paper compares quite well with that available for the other species of the genus. However, some differences are notable.

Referring to vocal activity, *T. ruspolii* is a relatively silent species, while most other turacos are usually quite noisy (Fry *et al.* 1988). The difference is particularly striking in comparison with *T. leucotis*, which is probably its closest relative (Moreau 1958, Hall & Moreau 1962) and is sometimes sympatric with *T. ruspolii*. It must be recalled, however, that this study only covered a period of under three months, and that there is thus no certainty that *T. ruspolii* is a silent species during other times of the year.

The description of the nest and the eggs by local people is in good accordance with those available for other species of turacos (Courtenay-Latimer 1942, Fry *et al.* 1988, Fotso 1993). The possible nesting record for the end of May indicates that breeding could start at the end of the long rains. *T. leucotis* was breeding in the study area in the same period, since two nests of this species were found, one at Dawa (5°20N, 39°02E) and the other at Kibre Mengist (5°53N, 39°00E).

As for its feeding preferences, *T. ruspolii* obviously depends on the fruits that are most common and easily available in its range. Its diet, however, seems not to be restricted to a few food sources and it is likely that the species will prove able to feed on most kinds of fruits with soft pulp smaller than about 2.5 cm in diameter.

Some particulars of the behaviour of *T. ruspolii* seem to be related to its preferred habitats, that is, relatively dry forest margins and woodlands. Most (59 per cent) of the observations were of grouped individuals, and large groups were especially frequent in the morning, when most feeding took place: this could be a consequence of the food plants being rarer and more spaced from each other in the woodlands than in the forests, thus obliging birds from a relatively large area to gather on each food plant. On the other hand, individuals of *T. leucotis* that, in the study area, occupied wetter habitats than *T. ruspolii*, especially *Podocarpus* forests, where food sources are commoner, were mostly observed as solitary birds (Borghesio, unpubl. data).

The evidence, although not definitive, for the existence of local movements has never been reported for other turacos, and seems to be an adaptation to seasonal habitats where food availability is not constant. Other authors (Ash & Gullick 1989), having re-visited the same localities after some years, hypothesized that dramatic numerical decreases could have occurred. However, this could prove incorrect if the observations were carried out in different seasons of the year. The only way to correctly evaluate the population trend of *T. ruspolii* seems to be of repeating counts in the same localities and at exactly the same period of the year, in order to rule out the possibility of movements that could conceal population changes.

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Records of birds from the forests of the East Usambara lowlands, Tanzania, August 1994–February 1995

Tom D. Evans

Following the completion of the Frontier-Tanzania Coastal Forest Survey Programme, the Society for Environmental Exploration and the Faculty of Science, University of Dar es Salaam have together embarked on a similar joint programme of surveys in the East Usambara lowlands, Tanga Region, northeast Tanzania. As part of this programme, bird surveys were carried out in the East Usambaras from August 1994 to February 1995 in five forest patches—Magrotto, Kisiwani, Manga, Longuza (north) and Kwamgumi. Manga and Longuza (north) had not been visited by ornithologists before. Previous coverage below 400 m during the warm season, October–March, had been largely restricted to a single site, Kisiwani. This paper summarizes the new distributional data gathered, and observations of seldom-recorded species. New data on forest extent and conservation prospects are also given. Throughout this paper the species order and nomenclature follow Britton (1980) for the passerines and the *Birds of Africa* (Brown *et al.* 1982, Urban *et al.* 1986, Fry *et al.* 1988) for the non-passerines, with modifications recommended by Turner *et al.* (1991).

Study sites and coverage

The five study sites are shown in Fig. 1 and site characteristics and ornithological coverage are summarized in Table 1. Magrotto is a privately owned estate with adjoining patches of village forest. The other forest blocks are named after the Forest Reserves within which they lie, except for 'Kisiwani'. This site straddles Kihuhwi–Sigi Forest Reserve and the south part of Longuza Forest Reserve, each of which contains other forest patches. I have named it after the nearest village, for clarity and convenience.

I gathered the bulk of the ornithological data. In addition to diurnal and nocturnal observation at all sites, mist-netting was conducted at Manga (1970 net metre-hours) and 50 birds were caught and ringed. A great deal of survey effort was concentrated on investigating the population density of Sokoke Scops Owls *Otus ireneae* (see Evans in prep.).

Most of Magrotto Hill has been deforested, but small patches of moderately degraded forest remain as a broken ring on the slopes around the recently abandoned Amboni Oil Palm Estate, which occupies a wide basin at the top of the hill. This forest is more than 400 m higher than the other study sites in this paper. The hill is the main water catchment for the town of Muheza and many smaller villages. There is a proposal to establish the estate and surrounding forest as a protected area (probably a Forest Reserve) and to allow natural forest to regenerate in the estate, but at the time of writing funds were not available (A. Tye, *in litt.* 1995). The site is isolated by several kilometres of cultivated land from the nearest sizeable forest block.

Manga has been heavily logged and is under continuing pressure from illegal pitsawing operations. Small stands—a few hectares in size—of virtually unlogged

Table 1. *Study sites and completeness of bird inventory in forest habitat at each site*

Site	Magrotto	Kisiwani	Manga	Longuza (N)	Kwamgumi[1]
Location	38°46E 5°07S	38°41E 5°06S	38°46E 5°02S	38°42E 5°03S	38°44E 4°57S
Forest area (km^2) at:					
0–400 m	0	2	11	2	23
400–800 m	3	1	0	0	16.5
>800 m	0.5	0	0	0	3
Altitudinal range	580–900 m	200–530 m	130–340 m	130–360 m	130–1100 m
Altitude surveyed	580–900 m	200–490 m	130–340 m	130–250 m	130–400 m
Field dates[2]	1/8–13/9/94	22/9–1/10/94 31/12/94–3/1/95	12/10–7/12/94	9–15/1/95	24/1–4/2/95
Diurnal coverage[3]	Good throughout	Moderate all S of Sigi River	Good none E of Mruka River	Moderate N third of natural forest only	Moderate NW corner only
Nocturnal coverage[3] (h)	Good (50) throughout	Poor (5) only along road	Good (75) none E of Mruka River	Poor (10) N third of natural forest only	Moderate (38) NW corner only. No moonlit nights

1. Site data include the contiguous Segoma and Bamba Ridge Forest Reserves, but almost all fieldwork was within Kwamgumi Forest Reserve.
2. Include some days not spent on ornithological surveys.
3. Completeness of bird inventory, on a three-point scale, Good/Moderate/Poor.

forest remain in the south and west of the reserve. The Mruka River is a perennial stream 3–5 m wide which supports tall riverine forest on long stretches of both banks. Degraded forest remains in patches along the larger Sigi River, but a belt of open grassland within the reserve separates the main forest block from this river. Apart from these two rivers there are no permanent watercourses. This is probably one of the driest East Usambara forests, lying as it does several kilometres from the steep escarpments where much of the rainfall is generated.

Kwamgumi supports some of the tallest, least-disturbed lowland forest left in the East Usambaras. However, pitsawing has left degraded patches throughout the lower parts. Kwamgumi forms part of the largest lowland block in the Usambaras. The East Usambaras Catchment Forest Project, together with the Kambai Forest Conservation Project, are in the process of establishing a corridor of replanted forest linking this with

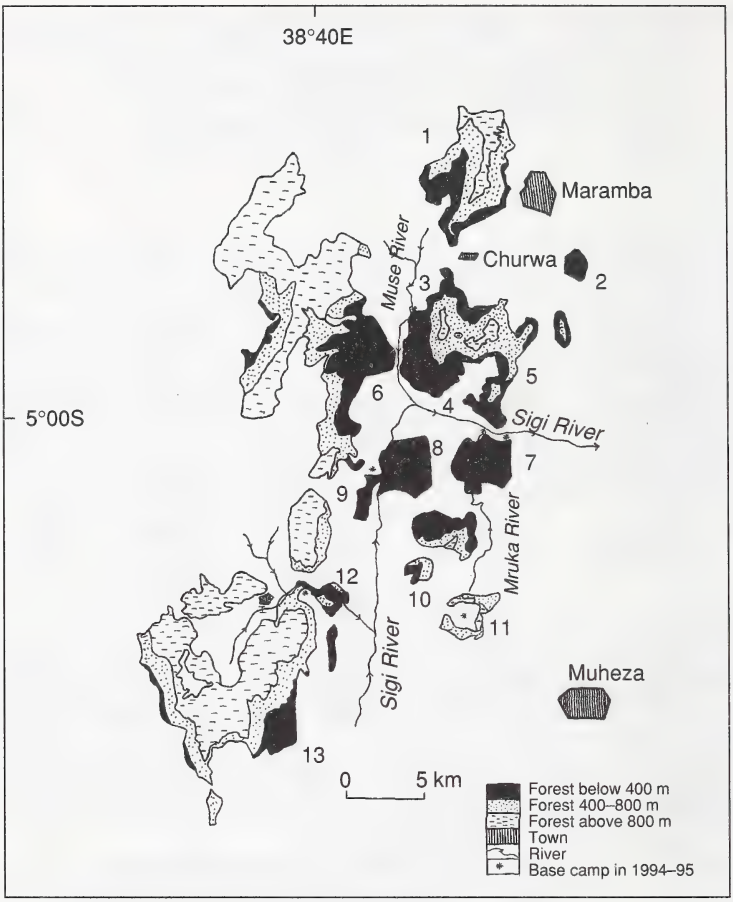

Figure 1. *Forest areas in the East Usambaras and place names mentioned in the text*
1 = Mtai, 2 = Mtapwa, 3 = Kwamgumi, 4 = Segoma, 5 = Bamba Ridge, 6 = Semdoe, 7 = Manga, 8 = Marimba, 9 = Longuza (north), 10 = Mgeza, 11 = Magrotto, 12 = Kisiwani, 13 = Kwamsambia

the proposed Semdoe Forest Reserve, which is the second largest block. There is also a wide connection with forests above 800 m.

Longuza (north) is small and has been heavily logged. It was planned to convert it to plantations of exotic species (as has already happened with most of the reserve) but policy changes in the 1960s resulted in the natural forest being reprieved before clear-cutting took place (S. Johansson, *in litt.* 1995). Local cultivation and exotic timber plantations border the forest on three sides. On the fourth side, grassland separates it from a belt of riverine forest along the Sigi River and from Marimba Forest Reserve on

the other bank, except for a tenuous forest link about 200 m in width at the northernmost end of the reserve.

The forest at Kisiwani occupies two hilltops and the very steep valley between them. The Sigi River flows through this valley along a series of rapids and waterfalls and there are over 2 km of riverine forest on each bank. The forest has been moderately degraded by pitsawing (which was still occurring at the time of the survey) and forest stature is further reduced by the steep gradients, extensive boulder piles and rocky outcrops. The site is isolated from other lowland areas by extensive cultivation or exotic plantations; the only habitat link with higher altitudes is along the banks of the Sigi River.

Lowland forest cover in the East Usambaras

Forest cover was estimated from Fig. 1, a modification of Fig. 3 in the Cambridge Tanzania Rainforest Project (1994). A recently completed inventory of the East Usambara forests (Hyyatiäinen 1995) was not available before submission of this paper. It has been updated from its predecessor by deleting large areas of forest which, though marked on 1:50 000 topographic maps (published by the Ordnance Survey, UK for the Government of Tanzania), were not found during the 1994–1995 fieldwork (which included several long walks outside the sites where birds were surveyed, above). For submontane areas, Fig. 1 is based on AFIMP (1986). The map clearly shows the high degree of forest fragmentation. Damage from logging and other human activities is also very widespread. Scattered patches of degraded forest up to a few hectares in size remain in many areas, often on hilltops, but are not shown in Fig. 1.

For ornithological purposes, lowland areas are those below 800 m, following Moreau (1935) and Stuart (1983). In Fig. 1, this is divided into areas below and above 400 m. The area below 400 m is roughly the extent of habitat for three key bird species: Sokoke Scops Owl *Otus ireneae*, East Coast Akalat *Sheppardia gunningi* and Swynnerton's Robin *Swynnertonia swynnertoni*, though all are absent from some parts of this altitudinal belt, and may extend a little higher in places. According to Fig. 1, there are 187 km^2 of lowland forest in the East Usambaras, 97 km^2 of it below 400 m.

Records of threatened and near-threatened species

The following species were listed by Collar *et al.* (1994). Records are summarized in Table 2. Categories of threat taken from Collar *et al.* (1994) are given immediately after the scientific name. According to that study, a threatened, vulnerable species "faces a high risk of global extinction in the medium-term future". Near-threatened species are not currently thought to be threatened with extinction, but may become so, and require special monitoring.

Southern Banded Snake Eagle *Circaetus fasciolatus* Near-threatened. This species was detected (mainly by call) on most field days at all sites. Individuals were often seen on relict standing trees in Magrotto oil palm plantation and also observed hunting in Kwamtili cocoa plantation, on the northern edge of Kwamgumi, sometimes more than 1 km from natural forest at both sites.

Fischer's Tauraco ***Turaco fischeri*** Near-threatened. These birds were common, being heard at least daily and often seen, at all sites visited.

Sokoke Scops Owl ***Otus ireneae*** Threatened: Vulnerable. This species was recorded from Kwamgumi, Manga and Longuza (north). The last two are new localities. It is almost certainly absent from Magrotto and probably absent from Kisiwani (where too little time was spent searching at night to be sure). The species was first found in the East Usambaras in 1992 (Evans *et al.* 1994) and before that, was known only from the Arabuko-Sokoke forest in Kenya. Most records to date have been from gently sloping forest up to 350 m. A record from Kwamgumi at *c.* 400 m in February 1995 is the highest to date. At this altitude, the slopes were very steep (enough to make walking without holding on to trees difficult) and exposed rock was common.

Detailed notes on habitat use, behaviour and a pilot survey of population density can be found in Evans (in prep.). These preliminary estimates of density (by a hybrid line-transect/mapping method) suggested a density of 3–4 territories km^{-2} in Kwamgumi and <1.5 territories km^{-2} in Manga. The difference between these two forests, which is thought to be real, may be due to the heavily degraded nature of Manga. The densities are markedly lower than the 6–9 territories km^{-2} recorded in Arabuko-Sokoke (Britton & Zimmermann 1979, Kelsey & Langton 1984, Virani in prep.). Though calculation of the total number of territories in the East Usambaras is not possible, these sample areas suggest a number in the low hundreds. There are thought to be just over 900 territories in Arabuko-Sokoke (Virani in prep.).

Usambara Eagle Owl ***Bubo vosseleri*** Threatened: Vulnerable. None was recorded by the author despite nearly 200 h of nocturnal work spread over six months. However, individuals were heard in Kwamgumi at 950 m in mid-February 1995 and at 200 to 300 m in both Kwamgumi and Segoma in early March 1995 (S. Cox, verbally, 1995). The latter are the first lowland records in the October to March period, when most altitudinal migrants have returned to higher altitudes to breed (Stuart 1989). Together with records in Evans *et al.* (1994) they suggest that this species is resident in the lowlands (*contra* speculation in Collar *et al.* 1994).

East Coast Akalat ***Sheppardia gunningi*** Threatened: Vulnerable. This species was commonly heard in Manga and Longuza (north) and occasionally heard in Kwamgumi, but not recorded in Magrotto (which was presumably too high) or, oddly, Kisiwani. Stuart (1983) also failed to find the species at Kisiwani. The species clearly tolerates quite severe degradation of habitat, since as many as 5–10 could be heard along 1–2-km stretches of trail in Manga and Longuza (north) where tall evergreen thicket and small trees (canopy height 6–12 m) predominated, representing regeneration after heavy logging. However, recently logged areas with extensive thickets of *Olyra latifolia* and a less shady understorey were apparently avoided. The highest altitude recorded for the East Usambaras is at around 300 m in Manga.

Swynnerton's Robin ***Swynnertonia swynnertoni*** Threatened: Vulnerable. In Manga, only five singing birds were found, in the tallest remaining forest stands visited. Others

can be expected to occur in additional remnant stands along the course of the Mruka River, but the total population is probably small. The species was absent from the degraded forest of Longuza (north), but during fieldwork there two were heard singing on the opposite bank of the Sigi River, in the taller forest of Marimba Forest Reserve. A few were also heard singing in areas of tall, well-structured forest in Kwamgumi, though fewer than in August 1992, possibly due to seasonal differences in output. This species appears markedly less tolerant of logging than is the East Coast Akalat. The Manga population is probably in danger of extinction if the current illegal logging of remnant stands of tall forest is allowed to continue. It was not found in Magrotto or Kisiwani. A female was observed in Kwamgumi in moderately tall forest on fairly steep slopes near a rocky outcrop at *c.* 450 m on 1 February 1994. This is the second highest record for the East Usambaras, the highest being the first record, at 550 m in Mtai in 1990 (Evans & Anderson 1993). Two were seen with a juvenile not long out of the nest in Kwamgumi in late February 1995 (S. Cox, verbally, 1995).

Table 2. *All known records of threatened and near-threatened species from the study sites*

Pre-1994 records in parentheses

Species	Magrotto	Kisiwani	Manga	Longuza (north)	Kwamgumi
Threatened					
Sokoke Scops Owl			+	+	+
Usambara Eagle Owl					+
Swynnerton's Robin			+		+
East Coast Akalat			+	+	+
Amani Sunbird	+	(+)	+		+
Banded Green Sunbird	+	+			
Near-threatened					
Southern Banded Snake Eagle	+	+	+	+	+
Fischer's Turaco	+	+	+	+	+
Plain-backed Sunbird		+	+	+	+

Amani Sunbird ***Anthreptes pallidigaster*** Threatened: Vulnerable. The only sightings were of a female carrying nest material at 600 m in Magrotto on 11 September 1994 and a pair on the forest edge in Manga at 200 m on 5 December 1994.

Plain-backed Sunbird ***Anthreptes reichenowi*** Near-threatened. This species was abundant at Manga, Kwamgumi, Kisiwani and Longuza (north) but absent from Magrotto. It occurs at high densities even in degraded forest. Nest-building was observed on 4 November in Manga at 150 m. The nest was a pouch, attached along about 5 cm of the side branch of a liana (rather than hanging by a point or loop). It hung about 5 m up in a void several metres across in an area of low, degraded forest. It appeared to be formed of dead leaf fragments, silk and many horsehair-like black threads, presumably the fungal mycelia described by Moreau (1935).

Banded Green Sunbird ***Anthreptes rubritorques*** Vulnerable. Singles and twos were seen on five occasions at about 800 m in Magrotto in August and September. A pair was watched nest-building in Kisiwani forest at 300 m from 28 September to at least 1 October 1994 This is the first breeding record below about 800 m, above which altitude they breed widely (Stuart 1983, 1989). They may breed throughout the 300–800 m altitudinal belt on the escarpments of the mountains. The nest was being built about 15 m up in the crown of a leafless tree standing over the main Amani–Muheza road, deep in the forest. The structure of the nest was not clearly visible as it nestled amongst the dense twiggy growths that smothered the tree's upper branches. The male stood sentry in a neighbouring leafless tree, calling frequently, while the female shuttled back and forth collecting and adding nest material, including silk from spider webs. Moreau & Moreau (1937) describe similar behaviour by a pair they watched.

Other significant ornithological records

In contrast to the fieldwork in 1992 (Evans *et al.* 1994), the 1994/95 fieldwork added no new forest birds to the East Usambara list. The following records are of interest because they are of seldom-reported species or because they provide new information on the status of species within the East Usambaras. Full species lists are given in the Appendix.

Booted Eagle ***Hieraaetus pennatus*** One was seen on 13 October 1994 at Manga, flying south.

Ayres' Hawk Eagle ***Hieraaetus ayresii*** Singles were seen over forest on 4 August 1994 at Magrotto (600 m) and 2 November 1994 at Manga (150 m).

Crested Guineafowl ***Guttera pucherani*** There were hunters' reports from Magrotto and feathers were found twice in Kwamgumi but there were no records from Kisiwani or Longuza (north). At all four of these sites densities thus appeared low. By contrast, throughout Manga the density was apparently high, since many groups of 2–5 were seen, several dust baths with shed feathers were found and calls were heard on most days and frequently by night.

Buff-spotted Flufftail ***Sarothura elegans*** The call was heard on the night of 4 September 1994, in foggy conditions with intermittent drizzle. The bird was at 600 m in Magrotto in an area of forest with a sparse canopy and a very thick understorey of *Costus* sp. and abandoned cardamom *Elettaria cardamomum*.

Finfoot ***Podica senegalensis*** There were several sightings of 1–2 individuals along the Sigi River adjoining Manga in October–December 1994.

Barred Long-tailed Cuckoo ***Cercococcyx montanus*** Singles were heard in Manga (150 m) on 16 and 17 October 1994 and in Kwamgumi (150 m) on 30 January 1995. There are no other published lowland records for the October–March period in the East Usambaras, when the entire population was believed to move to higher elevations to

breed (Stuart 1989). A small proportion apparently remains in the lowlands.

Yellowbill *Ceuthmochares aereus* Yellowbills were seen and heard daily at all sites except Magrotto. Remarkably, there was no record from Magrotto, despite extensive apparently suitable habitat.

Spotted Eagle Owl *Bubo africanus* One with a damaged right eye repeatedly came to catch moths at a mercury-vapour bulb set at the estate manager's house on the forest edge, Magrotto, in August and September 1994. Another was flushed by day on 27 September 1994 about 200 m inside Kisiwani forest. In view of their close relationship, similarity in size and the potential for co-occurrence in the increasingly degraded and fragmented East Usambara forests, it is conceivable that this species may compete with the Usambara Eagle Owl.

Verreaux's Eagle Owl *Bubo lacteus* One was seen by day being mobbed by passerines on the forest edge in the proposed Semdoe Forest Reserve in August 1994 (A. Perkin and A. Hipkiss, verbally, 1994). This species may also be a potential competitor with the Usambara Eagle Owl.

Barred Owlet *Glaucidium capense* On the moonlit night of 14 January 1995, at least eight were heard in degraded forest in Longuza (north), *c.* 200 m. Some responded to a tape of the species from Chappuis (1978), others were calling spontaneously. One was in the same grove of trees as a calling Sokoke Scops Owl. There is only one previous East Usambara record, from Kwamgumi in 1992 (Cambridge Tanzania Rainforest Project 1994).

Fiery-necked Nightjar *Caprimulgus pectoralis* This species was only recorded at Manga. Calls, often attributable to more than one individual, were heard by night from birds overflying the forest and nearby scrubby areas. Calls were heard regularly in the period 12–21 October 1994, during clear, brightly-moonlit nights. None was heard thereafter, despite a great amount of nocturnal ornithological coverage.

Bar-tailed Trogon *Apaloderma vittatum* One was recorded in Magrotto at 750 m in August 1994. There was also one lowland record, of a male in a mixed-species flock at 200 m in Manga on 4 November 1994. This is the first lowland record for the October–March period in the East Usambaras (see Stuart 1989).

Half-collared Kingfisher *Alcedo semitorquata* This species was recorded regularly from Manga (Sigi River, Mruka River and a seasonal pool at the forest edge), from Longuza (north end, along the Sigi River bordering Marimba Forest Reserve) and from Kwamgumi (along the Muse River). All sites were well wooded, but not necessarily in closed forest. There are no other published lowland records from the East Usambaras, although there is one specimen in the collection of the British Museum (Natural History) from the lowlands near Marimba (pers. obs.).

Silvery-cheeked Hornbill *Ceratogymna brevis* There was only one record from Magrotto, in August, in contrast to Trumpeter Hornbills *C. bucinator,* which were seen

daily in flocks of 50–100. There were records from Kisiwani forest in both study periods, but only of overflying birds. There were no records from Manga. By contrast, in Kwamgumi, just a few kilometres away from Manga at the same altitude, several feeding parties were encountered daily. They were also seen flying to and from Marimba Forest Reserve in January 1995. Stuart (1989) only recorded them down to 450 m, but in view of the records above and those of the Cambridge Tanzania Rainforest Project (1994), they are clearly regular visitors during both warm and cold seasons in several forests as low as 150 m.

Eastern Green-backed Honeybird ***Prodotiscus zambesiae*** Singles were seen in Magrotto at 700 m on 8 September 1994 and Kisiwani forest at 400 m on 1 January 1995. Good views were obtained at around eye-level and the birds were readily identified by the combination of the fine bill, bright green wings and mantle, dull grey head, nape and breast and whitish lower belly, with gradual transition between these tracts of colour.

Pallid Honeyguide ***Indicator meliphilus*** Singles were seen in Manga at 150 m on 19 November 1994 and Kisiwani at 350 m on 2 January 1995. They were distinguished from adult the Lesser Honeyguide *I. minor* by their small size, lack of malar stripe and green head, and from juvenile Lesser Honeyguide by their small size.

Mombasa Woodpecker ***Campethera mombassica*** This species was uncommon (with records on less than half the field days) in Manga and Kwamgumi. It was not seen, but seems likely to occur, in Longuza (north) and Kisiwani forests. The only one seen in Magrotto was not separable from the Golden-tailed Woodpecker *C. abingoni* on the views obtained. There are as yet no confirmed records of *C. (abingoni) abingoni* from the East Usambaras. An occupied nest-hole was found in Manga in late November 1994, in the underside of a dead branch (*c.* 10-cm diameter) 3 m up in a tree on the forest edge.

Little Greenbul ***Andropadus virens*** This very vocal species is usually considered ubiquitous in the East Usambara forests (e.g., Stuart 1989). However, in Manga in October–December 1994, it was apparently absent from the vast majority of the reserve, including quite tall forest in the south and north-east. A few were heard along the banks of the Mruka River in lush but quite degraded forest growth. In Longuza (north) the species was common in habitat apparently similar to most of Manga. It was possibly overlooked in Manga due to a seasonal lull in calling, but calling activity was high at Kisiwani immediately before the Manga survey period, at Amani during and immediately after, and at Jozani forest, Zanzibar, very soon after (pers. obs.), so this seems somewhat unlikely.

Yellow-bellied Greenbul ***Chlorocichla flaviventris*** Commonly found in degraded areas of Manga Forest Reserve. Also present in Kwamgumi (one record from degraded forest beside the Muse River) and Longuza (north). In 1992/93 the only records came from Mtapwa (Cambridge Tanzania Rainforest Project 1994).

Yellow-streaked Greenbul *Phyllastrephus flavostriatus* Like Little Greenbul, this vocal species was unaccountably scarce in Manga in October–December 1994 but common at all other study sites. In addition to sites along the Mruka River, it was present in the tall forest in the south of Manga and there were two records from elsewhere in the reserve, but the abundance, or at least the conspicuousness of the bird was very low over most of the reserve.

Northern or Terrestrial Brownbul *Phyllastrephus strepitans* or *terrestris* Unidentified birds of this species pair were common in degraded forest in Manga, with single records from Kwamgumi and Kisiwani. Previous workers report only *terrestris* from the East Usambaras (e.g., Moreau 1935, Stuart 1989), though *strepitans* is known from Tanga to the east (Sclater & Moreau 1932–33) and Mafi Mount south of the West Usambaras, whence there are specimens in the British Museum (Natural History) (pers. obs.).

Eastern Bearded Scrub Robin *Cercotrichas quadrivirgata* This elusive species was seen several times in Manga below 300 m in October–December and may have been under-recorded as the call was known, but not the song. A very recently-fledged bird was found in Manga on 1 December 1994. In 1992/93, the only record came from Mtapwa (Cambridge Tanzania Rainforest Project 1994).

Orange Ground Thrush *Zoothera gurneyi* One was seen in Magrotto at 600 m on 14 August 1994, in the dense undergrowth near a stream in an oil palm plantation, and another in forest there at 600 m on 31 August 1994.

Grey-backed Camaroptera *Camaroptera brachyura* A high proportion of individuals could not be assigned to either form of this species due to their skulking habits. All but two of the birds that could be assigned were Grey-backed *Camaroptera (brachyura) brachyura*. This was recorded at all sites except Kwamgumi (where it was recorded in 1992 (Cambridge Tanzania Rainforest Project 1994). One well seen at 600 m on Magrotto in August 1994 and another at 400 m at Kisiwani in September 1994 were Green-backed *C. (brachyura) brevicaudata*, the green mantle colour contrasting obviously with the grey nape but not the green wing coverts. Both were at least 50 m within degraded forest 15–20 m tall. Thus the two forms appear to co-exist in the East Usambaras. The two have been regarded as separate species by, for instance, Sibley & Monroe (1990).

Southern Hyliota *Hyliota australis* This species was seen daily at Kisiwani where 5–10 (perhaps more) were present as scattered ones and twos along the 2 km of road through the forest, which provided ideal canopy-viewing conditions. One was seen in Manga. They were usually seen in mixed-species flocks with other small passerines. They foraged mainly in the highest tree crowns (above 15–20 m), often those bare of leaves, keeping to the twigs and smaller branches. They seldom called, and no diagnostic call was noted.

The species can be difficult to see from paths under the forest canopy, but nonetheless, the small number of records over the past five years (see Cambridge

Tanzania Rainforest Project (1994) for other records) suggests a small, patchy population. The only published records above 400 m are of the type specimens, which were taken at 900 m [3000 feet] (Sclater 1932).

The possibility has been raised (C.H. Fry, *in litt.* to A. Tye 1994) that the race *H. a. usambarae* deserves specific rank because the female is thought to have black dorsal plumage identical with the male. This is true for the only known female specimen of *usambarae*, which is in the British Museum (Natural History). In all other races the male is black above, the female dark brown (Mackworth-Praed & Grant 1960, 1963, 1973). If treated as a species, it would merit great conservation concern because of its small range and apparently low numbers. The split has not been proposed with complete confidence as it is conceivable that the crucial specimen has been wrongly sexed. It was hoped to confirm the theory by observing the species in the wild.

It was difficult to judge the precise colour of many of those seen in 1994–95 as they seldom descended as low as 20 m from the ground and were thus typically seen from below, against a bright sky. It was also impossible to be sure that two associating together were male and female. Nonethless, I have yet to see a bird believed to be brown above, and I have seen at least ten, often moving in twos, which I was confident were black. I suspect that the female's plumage will indeed prove to be similar to the male's. It would be worthwhile to invest effort in canopy mist-netting at Kisiwani in an attempt to fully resolve this question.

Kretschmer's Longbill ***Macrosphenus kretschmeri*** This species was common, often several individuals being heard each day, at Kisiwani, Longuza (north), Manga and Kwamgumi. It was presumably overlooked at this third site in 1992 (Cambridge Tanzania Rainforest Project 1994). It was less commonly heard at Magrotto. Vine-smothered standing trees in logged areas and the forest edge were the preferred habitat.

Black-throated Wattle-Eye ***Platysteira peltata*** Females were seen in riverine forest beside the Sigi River (140 m) in Longuza Forest (north) on 11 January 1995 and in riverine forest beside the Muse River (140 m) just north of Kwamgumi on 4 February 1995. These appear to be the first published East Usambara records since Sclater & Moreau (1932–33).

Waller's Chestnut-wing Starling ***Onychognathus walleri*** This vocal species was common at Magrotto. It was also common at two of the lowland sites, Kisiwani (both study periods) and Kwamgumi where it was present below 200 m. However, it was not found in Manga or Longuza (north). Stuart (1989) states that it occurs throughout the East Usambara forests but it may prove be at least seasonally absent from some.

Yellow White-eye ***Zosterops senegalensis*** Occasional small parties were seen as low as 600 m in Magrotto. Stuart (1989) lists them as occurring only as low as 800 m in the East Usambaras.

Red-headed Bluebill ***Spermophaga ruficapilla*** Singles were seen in Magrotto, Manga, Kisiwani (twice), Longuza (north) and Kwamgumi. They were often detected by their loud call, a sharp *pik* note. The Longuza bird was in a sprawling thicket of

shrubs and lianas no more than 6 m tall, with grassy lawns, close to a taller stand of forest trees. The Manga bird was in an area with less than 50 per cent tree canopy cover (due to logging) and a tall, dense shrub layer. These two records indicate some tolerance of degraded forest. The Longuza sighting, on 14 January 1995, was of a male singing while hopping around energetically inside the thicket. The song was a jumble of twitters and weak chirps, mostly quite high and stuttery, varying suddenly in speed, rushing then slowing. A male was seen on 31 September 1994 in Kisiwani carrying a bundle of wood fibres, presumably for lining a nest.

Conservation Measures

This is not the place to reiterate the great range of conservation recommendations that have been made for the East Usambaras (see, e.g., Stuart 1983, Hamilton & Bensted-Smith 1989, Cambridge-Tanzania Rainforest Project 1994, Anon 1994, EUCFP 1995). A few points of current interest are, however, listed here.

1. Most of the remaining lowland forest has been incorporated into the Forest Reserve system, or incorporation is under way, thanks to the energetic efforts of the East Usambara Catchment Forest Project. However, the Catchment Forest Office remains dependent on continuing external financial support to maintain adequate policing levels. The long-term future of these sites is far from assured.
2. Attempts to upgrade legal protection for a large area to be known as the 'Amani Nature Reserve' are progressing slowly (EUCFP 1995), although levels of disturbance have already been reduced (S. Johansson, *in litt.* 1995). The nature reserve will incorporate a limited area of lowland forest, at Kwamsambia, in addition to large areas of prime submontane forest. If an adequate sample of lowland forest were to benefit from such a scheme, a second reserve would be required, centred on the Kwamgumi–Segoma–Semdoe area. This is unlikely to be possible until the Amani Nature Reserve is successfully established.
3. A sizeable area of the western part of Manga forest block, including some tall forest along the Mruka River, still lies outside current Forest Reserve boundaries and should be incorporated as soon as possible. The process of gazetting is under way (S. Johansson, *in litt.* 1995).
4. Unprotected forest adjoins the eastern part of Marimba Forest Reserve and deserves incorporation in that reserve.
5. Two other significant patches of evergreen forest remain unprotected—Mtapwa and Mgeza (see Fig. 1). The possibility of protecting these should be explored soon, especially for Mtapwa which was being severely degraded for charcoal production in 1992 (pers. obs.).
6. Riverine forest is important because it is often particularly tall and rich, supports some species of wildlife, including birds such as White-backed Night Heron *Gorsachius leuconotus*, African Finfoot and Half-collared Kingfisher, which are not found in neighbouring areas of drier forest, and allows access to water for shy

forest mammals and birds. It is vulnerable because of its relatively small extent and the value of alluvial riverside sites for agriculture. Special attention should be given to this habitat where it occurs along the Mruka, Muse and Sigi rivers. Where these rivers form reserve boundaries, a belt (perhaps 50 m wide) along the unprotected bank could be considered for protection and regeneration of natural forest.

7. It would be valuable to encourage natural forest to regenerate on the grasslands in the north of Manga Forest Reserve and perhaps in the north part of Longuza Forest Reserve as well.
8. Pitsawing seemed to be occurring at a high level in Magrotto and Manga and at a moderate level in Kisiwani. Further action is needed at these sites, particularly Manga where few mature stands remain. The East Usambara Catchment Forest Project is giving a high priority to addressing this problem (S. Johansson, *in litt.* 1995).
9. Pitsawing pressure in Kwamgumi was clearly much less in 1995 than 1992 (pers. obs.). This is a good development, likely due in part to improved law enforecement.

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Appendix: Systematic list of species recorded in forest at the study sites

Confirmed presence (+) is shown. The columns represent:

Mn Manga October–December 1994
Kw Kwamgumi January–February 1994
L Longuza (north) January 1994
Kj Kisiwani January 1995
Ks Kisiwani September 1994
Mo Magrotto 600–800 m August–September 1994

Species (1)	Mn	Kw	L	Ks	Kj	Mo
Palm-nut Vulture *Gypohierax angolensis*	+	+	+	+	+	+
Southern Banded Snake-Eagle *Circaetus fasciolatus*	+	+	+	+	+	+
African Harrier-Hawk *Polyboroides typus*	+	+	+	+		+
African Goshawk *Accipiter tachiro*	+			+	+	+
African Little Sparrowhawk *Accipiter minullus*	+					
Black Sparrowhawk *Accipiter melanoleucus*	(2)					
Ayres' Hawk Eagle *Hieraaetus ayresii*	+					+
Crowned Eagle *Stephanoaetus coronatus*	+	+	+	+	+	+
Crested Guineafowl *Guttera pucherani*	+	+				
Buff-spotted Flufftail *Sarothrura elegans*		+				+
African Finfoot *Podica senegalensis*	+					
African Green-Pigeon *Treron calva*	+					+
Tambourine Dove *Turtur tympanistria*	+	+	+	+	+	+
Eastern Bronze-naped Pigeon *Columba delegorguei*	+	+	+	+	+	+
Red-eyed Dove *Streptopelia semitorquata*	+	+	+			+
Fischer's Turaco *Tauraco fischeri*	+	+	+	+	+	+
Barred Long-tailed Cuckoo *Cercococcyx montanus*	+	+				
Emerald Cuckoo *Chrysococcyx cupreus*			+			
Klaas's Cuckoo *Chrysococcyx klaas*	+		+	+	+	+
Yellowbill *Ceuthmochares aureus*	+	+	+	+	+	(3)
White-browed Coucal *Centropus superciliosus*	+					
Sokoke Scops Owl *Otus ireneae*	+	+	+			
Spotted Eagle Owl *Bubo africanus*				+		(2)
Usambara Eagle Owl *Bubo vosseleri*		+				
African Barred Owlet *Glaucidium capense*			+			
African Wood Owl *Strix woodfordii*	+	+	+			+
Mottle-throated Spinetail *Telacanthura ussheri*	+	+	+	+	+	+
Böhm's Spinetail *Neafrapus boehmi*	+		+	+		
Bar-tailed Trogon *Apaloderma vittatum*	+					+
Narina's Trogon *Apaloderma narina*	+	+	+	+	+	+
Brown-hooded Kingfisher *Halcyon albiventris*	+	+	+	+	+	+
African Pygmy Kingfisher *Ispidina picta*						+
Half-collared Kingfisher *Alcedo semitorquata*	+		+			
Green Wood-hoopoe *Phoeniculus purpureus*	+	+	+	+	+	(2)
Crowned Hornbill *Tockus alboterminatus*	+	+	+	+	+	(2)
Trumpeter Hornbill *Ceratogymna bucinator*	+	+	+	+	+	+
Silvery-cheeked Hornbill *Ceratogymna brevis* (4)		+				+
White-eared Barbet *Stactolaema leucotis*	+	+	+	+	+	+
Green Barbet *Stactolaema olivaceus*	+	+	+	+	+	+
Green Tinkerbird *Pogoniulus simplex*	+			(5)	(5)	

Species (1)	Mn	Kw	L	Ks	Kj	Mo
Moustached Green Tinkerbird *Pogoniulus leucomystax*						+(6)
Eastern Green-backed Honeybird *Prodotiscus zambesiae*					+	+
Scaly-throated Honeyguide *Indicator variegatus*	+	+	+	+	+	+
Greater Honeyguide *Indicator indicator*	+		+			
Lesser Honeyguide *Indicator minor*	+					
Pallid Honeyguide *Indicator meliphilus*	+				+	
Mombasa Woodpecker *Campethera mombassica*	+	+				(7)
Little Spotted Woodpecker *Campethera cailliautii*	+	+	+	+	+	+
Cardinal Woodpecker *Dendropicos fuscescens*	+	+	+	+	+	+
African Broadbill *Smithornis capensis*	+	+	+	+		+
Drongo *Dicrurus adsimilis*	+					
Square-tailed Drongo *Dicrurus ludwigii*	+	+	+	+	+	+
African Golden Oriole *Oriolus auratus*	+					+
Green-headed Oriole *Oriolus chlorocephalus*	+	+	+	+	+	+
Pale-breasted Illadopsis *Trichastoma rufipennis*	+	+	+	+	+	+
Black Cuckoo Shrike *Campephaga flava*	+			+		+
Grey Cuckoo Shrike *Campephaga caesia*		+	+	+	+	+
Stripe-cheeked Greenbul *Andropadus milanjensis*						+
Little Greenbul *Andropadus virens*	+	+	+	+	+	+
Yellow-bellied Greenbul *Chlorocichla flaviventris*	+	+				
Nicator *Nicator chloris*	+	+	+	+	+	+
Tiny Greenbul *Phyllastrephus debilis*	+	+	+	+	+	
Fischer's Greenbul *Phyllastrephus fischeri*	+			+		
Yellow-streaked Greenbul *Phyllastrephus flavostriatus*	+	+	+	+	+	+
Terrestrial Brownbul *Phyllastrephus terrestris*	(8)		(8)	(8)		
Common Bulbul *Pycnonotus barbatus*	+			+	+	+
Eastern Bearded Scrub-Robin *Cercotrichas quadrivirgata*	+					
Red-capped Robin-Chat *Cossypha natalensis*	+	+	+	+	+	+
Red-tailed Ant-Thrush *Neocossyphus rufus*	+	+	+	+	+	+
East Coast Akalat *Sheppardia gunningi*	+	+	+			
Swynnerton's Forest-Robin *Swynnertonia swynnertoni* (4)	+	+				
Orange Ground Thrush *Turdus gurneyi*						+
Yellow-throated Apalis *Apalis flavida*	+					
Black-headed Apalis *Apalis melanocephala*	+	+	+	+	+	+
Grey-backed Camaroptera *Camaroptera brachyura* ssp.	+		+	+	+	+ +
Green-backed Camaroptera *Camaroptera brachyura* ssp. (9)	+		+	+		
Southern Hyliota *Hyliota australis*	+			+	+	
Kretschmer's Longbill *Macrosphenus kretschmeri*	+	+	+	+	+	+
Ashy Flycatcher *Muscicapa caerulescens*	+			+		
Lead-coloured Flycatcher *Myioparus plumbeus*	+	+	+	+	+	
Forest Batis *Batis mixta*	+	+	+	+	+	+
Black-and-White Flycatcher *Bias musicus*	+	+	+	+	+	
Black-throated Wattle-eye *Platysteira peltata*		+	+			
Little Yellow Flycatcher *Erythrocercus holochlorus*	+	+	+	+	+	
Paradise Flycatcher *Terpsiphone viridis*	+	+	+	+		+
Crested Flycatcher *Trochocercus cyanomelas*	+	+	+	+	+	+
Mountain Wagtail *Motacilla clara*			+	+		+
Tropical Boubou *Laniarius ferrugineus*	+	+		+	+	+
Black-backed Puffback *Dryoscopus cubla*	+	+	+	+	+	+
Black-fronted (Many-coloured) Bush Shrike *Malaconotus (multicolor) nigrifrons*				+		+
Retz's Helmet-shrike *Prionops retzii*	+	+				

Species (1)	Mn	Kw	L	Ks	Kj	Mo
Chestnut-fronted Helmet-shrike *Prionops scopifrons*	+	+	+	+	+	
Black-breasted Glossy Starling *Lamprotornis corruscus*	+	+	+	+	+	+
Waller's Chestnut-wing Starling *Onychognathus walleri*		+		+	+	+
Red-wing Starling *Onychognathus morio*						+
Kenrick's Starling *Poeoptera kenricki*						+
Collared Sunbird *Anthreptes collaris*	+	+	+	+	+	+
Uluguru Violet-backed Sunbird *Anthreptes neglectus*	+	+	+	+	+	+
Amani Sunbird *Anthreptes pallidigaster*	+					+
Plain-backed Sunbird *Anthreptes reichenowi*	+	+	+	+	+	
Banded Green Sunbird *Anthreptes rubritorques*				+		+
Olive Sunbird *Nectarinia olivacea*	+	+	+	+	+	+
Yellow White-Eye *Zosterops senegalensis*						+(6)
Grosbeak Weaver *Amblyospiza albifrons*	+		+			
Dark-backed Weaver *Ploceus bicolor*	+	+	+	+	+	+
Peters' Twinspot *Hypargos niveoguttatus*	+	+	+	+	+	
Green-backed Twinspot *Mandingoa nitidula*	+			+		+
Red-headed Bluebill *Spermophaga ruficapilla*	+	+	+	+		+

Notes

(1) The following species occurred transiently in or over forest but were not thought to be regular users: Augur Buzzard *Buteo augur*, Honey Buzzard *Pernis apivorus*, Fiery-necked Nightjar *Caprimulgus pectoralis*, Little Swift *Apus affinis*, African Palm Swift *Cypsiurus parvus*, Speckled Mousebird *Colius striatus* and Striped Swallow *Hirundo abyssinica*.

(2) Forest edge, rather than within forest.

(3) The lack of records from Magrotto in August–September 1994 probably represented genuine absence.

(4) Also recorded in Marimba in January 1995.

(5) Tinkerbirds were heard but not seen at these sites. They are expected to be *P. simplex*.

(6) Recorded down to 600 m at Magrotto.

(7) Birds at this site were not distinguished from *C. abingoni*.

(8) Records could not be assigned between *terrestris* and *strepitans*.

(9) The *Camaroptera* species are split by some recent authors (e.g., Sibley & Monroe 1990).

Short communications

A record of Wattled Cranes *Bugeranus carunculatus* raising two young

Nyika National Park in northern Malawi is home to the only viable breeding population of Wattled Cranes *Bugeranus carunculatus* in the country (Dyer 1992). The Wattled Crane population, approximately 12 breeding pairs, is confined to the open montane grasslands of the Nyika Plateau (1900–2600 m) in the park's centre. Breeding success is highest in the late dry season (August–October) but breeding attempts have been observed year round (Dyer 1992).

On 11 November 1993, a pair of adult Wattled Cranes accompanied by two young birds were observed on the Nyika Plateau by R. D. Medland and D. H. Foot. The young birds were approximately half the height of the adults, with all-grey plumage, and still exhibited down feathers. On 1 January 1994, DPC, with Dr S. A. Berg and G. Lahner, first observed this group of four cranes. At this time, the two young birds had the characteristic plumage of the adults, except for having white crowns, and had reached about 90 per cent of the adult height. By the end of January, the young were almost the same size as the adults (M. Muller *in litt.* to DPC). Six other sightings of the group were reported by the above viewers and K. Sichinga over the following two months, always in the same territory. The last reported sighting was on 19 March 1994, by visitors to the park. No Wattled Cranes were observed thereafter in the area until 4 May 1994, when an adult pair was observed by K. Sichinga, who had been surveying the area on a regular basis.

Assuming that the young birds seen by Muller at the end of January were three months old, the age at which they attain adult size (Johnson & Barnes 1985), they would have been four and a half months old when last seen. This is in the vicinity of the fledging age reported by Johnson & Barnes (1985) and Maclean (1993). Given an incubation period of 33 to 40 days (Johnson & Barnes 1985, Maclean 1993), the young birds would have hatched at the end of October or beginning of November after egg laying in September, coinciding with the peak breeding season and consistent with the time to fledging from egg laying reported by Dyer (1992) for Nyika National Park.

Although clutches of two eggs are not uncommon in Wattled Cranes (Benson & Pitman 1964, Tarboton *et al.* 1987, Dyer 1992) records of two chicks being raised are very scarce. Benson & Pitman (1964) report on three cases in Zambia of two chicks hatching, at least one pair of which survived to fledging stage, but no other records could be found in published literature.

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Distinctive foraging behaviour by Willcocks' and Least Honeyguides *Indicator willcocksi* and *I. exilis*

We report some apparently undocumented behaviour shown by two species of *Indicator* honeyguide. All observations were made at Kanyawara Forest Station, Kibale Forest, Uganda on 24 and 25 April and 29 August 1994 and on 14 August 1996 from the verandah of a guest house in the station clearing some 100 m from the edge of the forest.

On the afternoon of 24 April 1994 a Willcocks' Honeyguide *Indicator willcocksi* was seen in a young (6-m) *Zanthoxylum gilletti* (De Wild.) Waterm. (= *Fafara macrophylla* (Oliv.) Engl.) (Rutaceae) tree. The leaves of this tree are very large, compound and borne alternately. The rhachis of each leaf is swollen at the base. It is also lignified for much of its length except for a well-defined strip of bright green tissue, several millimetres in width, that encircles the proximal part of the swollen base of the rhachis. This ring, at the point of junction of leaf with branch, is thus conspicuously different in appearance from the lignified branch and the remainder of the rhachis. This tissue may represent the abscission layer as *Z. gilletti* is deciduous.

The bird's activities were confined exclusively to these areas of the trees. It moved systematically from one leaf to the next, working around the base of each rhachis in turn, and was seen repeatedly to move its lower mandible rapidly, bill held open, in an upwards scraping motion across or through this green area. The honeyguide visited nearly all the leaves, except for the lowermost, on one stem of the tree, working both up and down it. It then transferred to the neighbouring stem of the same tree and, next, to a nearby tree of similar size, where the behaviour was repeated. The bird was not seen to visit a large quantity of semi-solid resin that had flowed from a wound in the tree and coagulated into a gum-like substance.

In all, the bird was in view for some 20 min allowing observation at close range (between 2 and 5 m at up to x20 magnification), apparently indifferent to the three rapt observers (LF, LAB, JO). It was silent throughout.

No insects—scale insects, whiteflies, etc.—were visible through binoculars or telescope at the sites visited. After the bird's departure, we inspected the tree at close

quarters. Although the leaves visited by the bird were out of reach, no insects were found on the equivalent sites of the lowermost leaves, nor was there evidence of any having been present (no exuviae, cadavers, or waxy deposits that mark the feeding sites of such insects). It was, however, not possible to tell whether there were any marks, scoured by the bird's bill, in the glossy cuticular waxes that covered these green areas; none was visible on the lowest leaves.

The following morning, what was initially taken to be the same bird was seen again in the same tree showing the same behaviour. A closer look revealed that it was, in fact, a Least Honeyguide *I. exilis*. Of similar size to *willcocksi*, it was darker grey below and darker green above. The lores were conspicuously white, offset by the very dark forehead and moustachial stripe. The head was consequently strikingly marked compared with the face pattern of *willcocksi* (uniform pale olive green but for a few darkish streaks on forehead and forecrown and an indistinct whitish eye-ring). The Least Honeyguide was only watched for 1–2 min before it flew off but it appeared to be behaving in a manner identical to that shown by the Willcocks' Honeyguide the day before.

A Willcocks' Honeyguide was also seen at this site, in the same trees, on 29 August 1994 (PW). It was watched for over 5 min manifesting very similar behaviour to that witnessed in April. The bird pecked at the base of the rhachides but did not appear to take in or swallow anything, such that at times it seemed as if it was 'pecking at thin air'. It may be, however, that the bird was again running its lower mandible rapidly over the surface tissue of the plant.

Finally, a Least Honeyguide was seen in the same trees at 14:20 on 14 August 1996 (LAB), and was watched for around 3 min during which it behaved in a similar fashion to the birds seen in 1994. This behaviour does not appear to have been reported before for either species nor, indeed, in the family as a whole (Friedmann 1955, Fry *et al.* 1988, L. Short, pers. comm.). This is perhaps not surprising even if it is common in *I. exilis* and *I. willcocksi*. These small, inconspicuous species would be extremely hard to locate, let alone observe well, when foraging in such a manner within forest, in a tree species that can reach 35 m in height (Kokwaro 1982).

It is tempting to conclude that the birds were taking and consuming cuticular waxes from the trees. Such a food source is, however, unknown in honeyguides (Friedmann 1955, Fry *et al.* 1988). Since we cannot be certain that the birds did ingest any wax, it is possible there may be other explanations for the behaviour.

One common feature of all the 1994 observations is that all were made shortly after heavy rain. This may, however, be no more significant than the shared reluctance on the part of the observers to get wet.

Acknowledgements

The authors are grateful to Makerere University and the Tropical Biology Association for making our visits to Kibale forests possible.

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Lincoln Fishpool, BirdLife International, Wellbrook Court, Girton Road, Cambridge CB3 0NA, UK, Leon Bennun and Joseph Oyugi, Department of Ornithology, National Museums of Kenya, Box 40658, Nairobi and Paul Weeks, Tropical Biology Association, School of Biological Sciences, University of Bristol, Woodland Road, Bristol, BS8 1UG, UK

Scopus 19: 110–112, March 1997 Received 5 March 1995

Red-billed Buffalo Weaver *Bubalornis niger*: a new record for Uganda

During a recent survey of the biodiversity of Karamoja, some observations were made on the Red-billed Buffalo Weaver *Bubalornis niger*. The bird was encountered twice during regular timed species counts. It was first noticed on 2 February 1996 at 18:10 in Acacia woodland in an impeded drainage area at Lopei, 2°32N, 34°17E. A pair was observed on the ground, feeding in the company of flocks of Wattled Starlings *Creatophora cinerea* and Red-cheeked Cordon-bleus *Uraeginthus bengalus*.

The following day at 10:50, a single male was observed moving from one thorny shrub to another in grass-steppe vegetation less than 1 km from the location of the initial sighting. On subsequent days, colleagues on the survey team reported seeing pairs feeding within the same woodland where the initial observation was made.

This species is fairly easily identifiable by the very conspicuous thick red bill and the white patch on the shoulder and secondary feathers (the female is earth-brown in colour). Britton (1980) regards this species and the White-billed Buffalo Weaver *B. albirostris* to be virtually allopatric members of a superspecies. Both occurred at Lopei. The Red-billed Buffalo Weaver is not listed for Uganda by Britton (1980) nor on the recently revised East African check-list (D. A. Turner, pers. comm.), but it appears to be common in the area we surveyed.

Acknowledgements

This survey was made under a sub-contract with the Institute of Environment and Natural Resources (Makerere University), and the Uganda Wildlife Authority. I am grateful to the other survey team members, especially Claudia Wolfmann and Robert Kityo, who were very co-operative during the survey.

Reference

Britton, P.L. (ed) 1980. *Birds of East Africa.* Nairobi: EANHS.

Christine Dranzoa, Makerere University, Box 10066, Kampala, Uganda

Scopus 19: 112, March 1997 Received 20 May 1996

First record of Northern Lapwing *Vanellus vanellus* in East Africa

During February 1995, a waterbird survey of the southern half of the Kenyan coastline was conducted by the staff of the Ornithology Department, National Museums of Kenya and the Kenya Marine and Fisheries Research Institute, Mombasa. The count of the birds at the mouth of the Sabaki River *c.*10 km north of Malindi was scheduled for 7 February. At around 11:30 we were counting birds on the mud flats *c.*100 m downstream of the mangroves. Gladys Moragwa, who was scanning across the river from us with a telescope, noticed a wader she did not recognize and asked me to identify it. The bird in question was similar in size, though shorter-legged, to a Spur-winged Plover *Vanellus spinosus* which was also present on the mud flat. The most obvious features were the dark, metallic green upperparts, white belly with broad black breast-band and a long, up-turned crest from the back of the crown. From the distinctive plumage it was unmistakably a Northern Lapwing *Vanellus vanellus*, a bird with which two of the survey group (CJ and Luc Lens) were very familiar from both northern and southern Europe.

The bird was watched for about 30 min and photographs taken with a 500 mm lens down to *c.* 50 m. Detailed notes were made as follows: bill relatively fine, $^2/_3$ the length of the head; crown dark; a slight, pale supercilium over the eye; long, lax crest approximately equal in length to the head and curling upwards; dark smudging in front of and below eye; from the side, a white patch stretching from the throat to cheek; nape grey-brown merging to grey-green on mantle: back and wings metallic dark green with clear buff tipping to the lesser and median coverts: visible tail feathers, black; wing tip reached end of tail: undertail coverts buffy orange; belly white: breast with dark, broad, U-shaped breast-band with a sharply defined lower border; legs pinky-red; bill black.

The Northern Lapwing is a resident and migratory Palaearctic species which breeds from North Africa and western Europe through central Asia to northern China in the east. Across most of its breeding range it is only a summer visitor that winters south to North Africa, the Middle East, northern India, southern China and southern Japan (Urban *et al.* 1986). In Africa its range is along the northern coastline, penetrating south only along the River Nile into northern Sudan where it is described as 'rare'. Other than the Sabaki bird, an individual seen in central Sudan at Kosti is the most southerly accepted record (Hogg *et al.* 1984). A record of a Polish-ringed bird in South Africa has been 'rejected' (Hayman *et al.* 1986, Urban *et al.* 1986).

The distinct and extensive buff tipping on the coverts and relatively short crest (for the species) suggests that the bird was in its first year (Hayman *et al.* 1986, Cramp 1983). This would make sense, as first-year birds are the most likely candidates for vagrancy (L. Lens, pers. comm.). The behaviour of the bird was also typical of a vagrant: it kept its distance from other birds on the mud flat and appeared to be unfamiliar with its surroundings—tending either to stand still in a hunched position or wander about with very little feeding activity, in contrast to the intense feeding of the other waders at the river mouth.

The Sabaki River mouth is 2000 km south-southeast of Kosti in Sudan. The origin of the Sabaki bird poses an interesting question. There are three possibilities. One is that it could have originated from the wintering population along the Nile (as presumably did the Kosti bird) and continued following, most likely, the Blue Nile southeastwards into Ethiopia and then on to the coast of Somalia before working its way south to reach Sabaki. A second possibility would be a bird from the wintering population in Afghanistan or southern Pakistan, which would have had to follow the southern Middle East coastline southwest, crossing the mouth of the Gulf of Aden to the Horn of Africa and from there, continuing southwards to Sabaki. A third option would be an origin from the wintering population in Saudi Arabia, whence a bird overshooting the wintering grounds would have continued down the Red Sea and probably crossed the Horn of Africa in an almost direct southerly line from around Aden. This would bring it close to Sabaki when it reached the eastern African coastline.

Acknowledgements

The coastal waterbird survey was undertaken as part of the Important Bird Areas Programme in Kenya, supported by the Royal Society for the Protection of Birds. KMFRI provided much logistical help. Colleagues taking part in the survey, who also observed this bird, were Luc Lens and Joseph Oyugi (NMK), Priscilla Boera and Gladys Moragwa (KMFRI). Photographs were taken by Koen de Voes.

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Colin Jackson, Ornithology Department, National Museums of Kenya, Box 40658, Nairobi

Scopus 19: 113–114, March 1997 Received 30 June 1995

Puvel's Illadopsis *Illadopsis puveli* in Budongo Forest: a new record for East Africa

The Budongo Forest is classified as a medium-altitude tropical moist semi-deciduous forest which lies at a mean altitude of 1100 m. Budongo is at the northeastern extreme of a belt of forests that run down western Uganda. As part of a study of the avifauna of this forest, five areas were intensively studied with point counts and mist-nets. In one region, an isolated block of about 25 km^2 called Kaniyo-Pabidi (Compartments K11–13), we caught an illadopsis-like bird which we could not identify easily. It was similar to a Pale-breasted Illadopsis *Illadopsis rufipennis* or Scaly-breasted Illadopsis *I. albipectus* (with no scaling) but the measurements, particularly the mass of the bird, were larger than for these species. During 12 days of netting, we caught 13 specimens

(one a juvenile) and collected two which were sent to the National Museums of Kenya for identification. After puzzling over them, Dr Luc Lens took them to the Royal Museum for Central Africa at Tervuren to consult with Dr Michel Louette and to compare them with *Illadopsis* specimens from west and central Africa. They came to the conclusion that this bird is Puvel's Illadopsis *Illadopsis puveli*, of the subspecies *strenuipes*, unrecorded previously in East Africa, although it is present in northeastern Zaïre (Mackworth-Praed & Grant 1973).

Description

Puvel's Illadopsis is larger than other commonly-caught illadopses in Budongo Forest. Table 1 compares the mean mass, body length, wing length, tail length and tarsus length for the four species we have caught there. The ranges of each are given below the mean. The measurements for Puvel's Illadopsis are all significantly larger than the other species (*t*-tests, $P < 0.001$).

The plumage is as described in Mackworth Praed & Grant (1973). The race *strenuipes* is brown above, including wings and tail, with less russet than the nominate, western race. The sides of the face are brown; the underparts are white, with a buff-brown band across the chest and on the flanks, making the white throat stand out. In the hand the throat is sometimes 'puffed out', as in the Red-tailed Greenbul *Criniger calurus*. The legs are a pale pink-white and noticeably long and strong.

Table 1. *Mean measurements of the four illadopsis species (Brown Illadopsis* I. fulvescens, *Pale-breasted Illadopsis* I. rufipennis, *Scaly-breasted Illadopsis* I. albipectus, *Puvel's Illadopsis* I. puveli*) caught in Budongo Forest and the ranges of the measurements. Note the lack of overlap in the mass measurements of* I. puveli

	I. fulvescens	*I. rufipennis*	*I. albipectus*	*I. puveli*
Sample size	60	14	18	12
Body length (mm)	153.2 (125–177)	153.9 (135–170)	147.6 (138–160)	172.3 (150–188)
Wing length (mm)	73.0 (63–89)	73.8 (87–80)	76.0 (68–90)	87.1 (81–92)
Tail length (mm)	61.2 (49–71)	62.3 (54–80)	57.5 (48–70)	70.9 (62–79)
Tarsus length (mm)	27.6 (23–32)	29.1 (25–32)	28.9 (25–33)	34.1 (31–36)
Body mass (g)	27.9 (20–37)	29.4 (23–35.5)	29.4 (26–35)	48.4 (41–52.5)

Calls and behaviour

A call was recorded from the juvenile bird and was given once by an adult as they sat in collecting bags. This call attracted another adult bird which came within 3 m of the bags. The call was three to four notes, rising and falling, to which the free adult replied

with a 'churring' call. The free adult spent a lot of the time on the ground, running from spot to spot, and was never seen above 1 m from the ground. At other times they have been seen in small groups of 3–5 individuals, feeding on the ground.

Habitat

Kaniyo Pabidi is one of the few parts of the Budongo Forest which has not been logged or treated with arboricide. Most of this part of the forest is dominated with *Cynometra alexandri* which creates a dense canopy with little understorey. However, the sites where this bird were trapped, although fairly deep into the forest, were in areas where the undergrowth was quite dense, often with the bushy shrub *Rinoria ilicifolia* forming the understorey.

Acknowledgements

We would like to thank Dr Leon Bennun, Don Turner and Roger Matthews for dealing with these birds for us in Nairobi and Dr Luc Lens and Dr Michel Louette for identifying the specimens in Tervuren. In addition, we want to thank the Uganda Forest Department for allowing us to work in Budongo and the ODA Forestry Research Programme and the Wildlife Conservation Society for funding us.

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A.J. Plumptre and I. Owiunji, Budongo Forest Project, Box 10066, Kampala, Uganda

Scopus 19: 114–116, March 1997 Received 11 March 1996

An albinistic Sanderling *Calidris alba* in the Bazaruto Archipelago, Mozambique

In a waterfowl census on the Bazaruto Archipelago, province Inhambane, southern Mozambique, we counted about 12 000 waders including 653 Sanderlings *Calidris alba*. A specimen observed on 26 January 1996 on Benguerúa Island had pure white plumage. Legs and bill, however, were black, and so, probably, was the eye, suggesting it was not a true albino. The bird was seen foraging on the sandflats together with other Sanderlings during low tide. Other flock members showed no unusual antagonistic behaviour towards it. As the bird was quite conspicuous even at a distance and to the naked eye, it might be sighted somewhere else.

Suzanne Fiebig, WWF Project Manager, kindly supported the census and was also present during this observation.

Drs Peter and Ursula Köhler, Korbinianplatz 1, 85737 Ismaning, Germany

Scopus 19: 116, March 1997 Received 18 March 1996

Co-operative breeding in two African warblers

The following records were made on a 2-ha property in Nairobi's Langata suburb.

Tawny-flanked Prinia *Prinia subflava*

On 3 December 1994 a *Prinia subflava* nest was located in a flowering papyrus *Cyperus papyrus* head some 3 m over water. By 11 December adults were carrying insects to the nest. Observation over the next nine days indicated that feeding was undertaken by three fully grown prinias: all three frequently being in sight and in close proximity to the nest at the same time. On 20 December the three adults were watched attending two newly fledged young in a nearby *Euclea* thicket.

This seems to be the first confirmed instance of co-operative breeding in *Prinia subflava*. It also appears to be the first record for the species nesting (a) in papyrus, (b) at a height of around 3 m and (c) over water.

Stout Cisticola *Cisticola robustus*

On 4 January 1995 a *Cisticola robustus* nest was found almost on the ground in a stand of lemon grass *Bothriochloa radicans c.* 80 cm tall. The nest was unlined, but contained four eggs. On 11 January at 09:15 two had hatched, by 18:00 three were hatched and by 08:00 on 12 January the fourth chick had emerged. During incubation the nest had been lined with plant down and a few small feathers.

On 18 January a hand placed close to the nest elicited harsh, sibilant squeaks from all four nestlings. Because these were not uttered in complete synchrony the combined squeaks ran together and sounded like an explosive two- to three-second hiss. Although the tone was higher, the result was reminiscent of an alarmed Puff-adder *Bitis arietans* and an effective defence.

The four fledglings had left the nest by 25 January, before they could fly, and distributed themselves in the grass up to 50 m from the nest site. Both while in the nest and subsequently, they were attended by three adults. From the difference in body size between sexes characteristic of the species, these were two females and one male.

Van Someren (1957) reported both his own and Lynes' observations of an apparent 'surplus of females' in nesting *Cisticola robustus*. Though not stated unequivocally, the inference was that the species was polygamous. While this might occur, their evidence is also in keeping with co-operative breeding. The observation reported here proves that this does take place and, when considered with both van Someren's and Lynes' comments, may be routine.

Reference

Van Someren, V.G.L. 1957. Days with birds. *Fieldiana* 38: 365–368.

I.S.C. Parker, Box 15093, Nairobi, Kenya

 Received 25 August 1995

First record of a Wattled Starling *Creatophora cinerea* in the Seychelles

On 13 July 1995 a greyish 'myna' was seen feeding on the ground with two Common Mynas *Acridotheres tristis* on Bird Island, Seychelles. When we attempted to walk closer to obtain a better view, the grey bird flew into a nearby *Casuarina* tree. The bird was watched for about 15 min using 8 x 30 binoculars while it perched and foraged in the tree and the following description was taken:

Upper parts brownish with back ashy brown, darker than underparts which were pale buff, in some lights showing a yellowish tinge. Primaries dark brown, some showing paler outer edges. In the wing coverts a pale whitish patch, rather than stripe. Rump white and tail dark brown. Under tail coverts pale buffy grey.

Head strikingly marked with yellow behind and below the eye, tapering to a point behind the eye. Eye black. Small black area at base of bill in front of eye and conspicuous black stripes extending from sides of lower mandible back along sides of chin and throat. Bill pink, as were legs and feet.

In flight the bird was starling-like, with pointed wings and shortish tail, and it displayed a prominent white rump. It did not call.

In the *Casuarina* tree the bird probed among the terminal rosettes of leaves. On 15 July it was seen again for long periods feeding on the ground, probing in short grass and chasing insects that it flushed. It walked jauntily, starling-fashion. On this date it was photographed, and was also seen by Mr John Gooders and a party of tourists, and it was probably the same bird as a "strange grey myna" seen by Philip Norah, who lived on Bird Island, about two weeks previously.

This description is clearly that of a Wattled Starling *Creatophora cinerea* and the brown, rather than black, primaries indicate that the bird was a female or subadult male. This is the first record of the Wattled Starling in the Seychelles. Wattled Starlings occur over much of eastern and southern Africa where Craig (in press) regards them as nomadic. Out of the African mainland they have been recorded as stragglers in Oman (Gallagher & Woodcock 1980), Yemen (Brooks *et al.* 1987) and Madagascar (Langrand & Sinclair 1994). This Seychelles record thus extends the species' range in the western Indian Ocean and suggests, along with the Arabian and Madagascar records, that nomadism in Africa can lead to vagrancy outside the bird's normal range.

Acknowledgements

This observation was made during a research visit to Bird Island. We are grateful to Mr and Mrs Georges Norah, managers of Bird Island, to Air Seychelles, to the Division of Environment, Government of the Republic of Seychelles, and the Percy Sladen Memorial Fund for support that made the visit possible. Adrian Craig kindly read the manuscript and advised on the age/sex of the bird.

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Chris J. Feare and Elaine L. Gill, Central Science Laboratory (MAFF), Tangley Place, Worplesdon, Surrey GU3 3LQ, UK

Scopus 19: 118–119, March 1997 Received 20 September 1995

New bird records for Uganda, with an addition to the East African avifauna

During the course of ornithological inventories carried out by the Uganda Forest Department in Labwor Hills Forest Reserve (FR) (2°36N, 33°45E), Kotido District, and Mt Moroto FR (2°36N, 34°48E), Moroto District, both in eastern Uganda, three bird species were recorded which apparently constitute the first confirmed records from Uganda. One species, the Bush Petronia *Petronia dentata*, represents an addition to the avifauna of East Africa. All three records have been accepted by the East African Rarities Committee (D. A. Turner *in litt.* to G. C. Backhurst).

Bush Petronia *Petronia dentata* A male specimen of this species was collected by Robert Oduko, a Forest Department ornithological inventory ranger, on 1 December 1993 in Abwor Hills FR. A small petronia, it was identified by its greyish crown, pale russet-brown mantle and russet-brown supercilium stripe extending behind the eye. The underparts were ashy white, and it had a paler throat with a smallish yellow spot at the base. The specimen has subsequently been confirmed at the Ornithology Department, National Museums of Kenya, Nairobi. This appears to be the first confirmed East African record of this species. Both Mackworth-Praed & Grant (1960) and Williams & Arlott (1980) assert that it occurs in northern Uganda, but Britton (1980) includes it only in parentheses stating that its occurrence in North Uganda requires confirmation. It is described as common throughout at low altitude in southern Sudan (Nikolaus, 1989).

Black-throated Barbet *Lybius melanocephalus* During the final week of a month-long inventory expedition to Mt Moroto FR, a camp was made close to the water-hole known as Kokilokit. This is situated at the base of the escarpment, at around 1200 m, within 6 km of the Kenyan border, and in an area believed to have been unvisited by ornithologists prior to our own visit. The vegetation is composed of extremely arid *Acacia*- and *Euphorbia*-dominated bushland, dissected by dried-up water courses. On 19 and 20 June 1994, a pair of Black-throated Barbets was observed about 1 km northeast of the water-hole, both times in exactly the same place. On each occasion the birds were viewed from around 10 m, on and around a large acacia stump and surrounding smaller acacias, about 3 m from the ground. Both birds appeared to be behaving in an agitated manner and uttered a harsh repeated *kow kow kow* call. They

were at first assumed to be Spotted-flanked Barbets *Lybius lacrymosus* but, on closer examination, it was noticed that there was no spotting on the flanks, and that the black-brown bib was not confined to the throat and neck, but extended down the breast and on to the belly, where it petered out. The remainder of the underside and moustachial area was white. There was a large white stripe over the eye extending down the neck, and a broad black eye-stripe extending back to join the black-brown of the head and mantle. The lower mantle, back and rump were black-brown flecked with yellow, while the flight and tail feathers were black-brown edged with yellow. The legs and bill were dark. This constitutes the first documented Ugandan record of this species, its previously recorded distribution finishing in northwestern Kenya (Fry *et al.*, 1988) where Britton (1980) describes it as wide-ranging in plateau country north of the Kenya highlands, and in the extreme southeast of Sudan where it is a common resident (Nikolaus, 1989).

Shining Sunbird ***Nectarina habessinica*** A number of Shining Sunbirds were observed at Mt Moroto FR between 17 and 23 June 1994 in the same area as the Black-throated Barbets described above. At the time, the significance of the species was not appreciated and as a consequence only limited notes were taken. Medium-sized, highly active sunbirds, they were continually moving between acacias and were watched down to about 10 m. The males were unmistakable, with metallic green plumage with a faint golden wash covering the back of the head, mantle, upper back, scapulars, throat and neck. The purple crown, broad bright red breast-band and yellow pectoral tufts were striking features. The belly, undertail coverts, lower back, rump and tail all appeared black. Female sunbirds—greyish, lighter underneath with a blackish tail—were seen as well but a description was not taken. Although previously recorded from the Kozibiri River in western Turkana District, northwestern Kenya close to the Ugandan border, this species has apparently not been seen within Uganda before and is placed in parentheses by Britton (1980).

The barbet and the sunbird were watched through 10 x 40 binoculars. While the authors are unfamiliar with the above species, they are familiar with the Spotted-flanked Barbet, the species most likely to be confused with Black-throated Barbet.

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 Received 3 May 1996

issue for guidance. Metric units should be used. A few examples of conventions are as follows: **dates:** 23 September 1991 [note the order, no comma, not '23rd']; **time of day:** 13:00 [note colon, no 'hours', 'hrs' or 'h']; **names of birds:** Cape Rook *Corvus capensis* [no comma, no parentheses, no author's name]; **list of references** at the end of a paper or short communication: authors' family names followed by a comma, then initials, each followed by a full point (= full stop, period); **names of journals:** to be given in full; **books:** after author(s), year of publication and title, give the town followed by the publisher. Examples:

Åkesson, Susanne 1993. Effect of geomagnetic field on orientation of the marsh warbler *Acrocephalus palustris*, in Sweden and Kenya. *Animal Behaviour* 46: 1157–1167.

Moreau, R.E. 1972. *The Palaearctic–African bird migration systems.* London: Academic Press.

Two copies of contributions, which will be acknowledged, should be typed/printed in double spacing on one side of the paper only, with wide margins all round. Clear handwritten MSS will also be considered. *Scopus* follows the first, preferred spelling of *The Concise Oxford Dictionary*, 9th edition. Both English and scientific names of birds should be given when the species is first mentioned, thereafter only one name should be used.

The bird names used should be those of a *stated work* and any deviations from this work should be noted and reasons given.

If possible, please send contributions on floppy disk, but please send two hard (= paper) copies as well.

Original colour or black and white **photographs** and **line illustrations** should not be larger than A4 (210 x 297 mm). Line illustrations should be on good quality white paper or board, or on tracing material; lettering should be of professional quality or marked in pencil on an overlay, not on the original figure. If you send your paper on disk, please include copies of all graphics as separate documents (files) in the program you used to create them.

Authors of 'papers' receive three copies of their contribution free of charge. Extra copies, which will be charged at cost, must be ordered when the MS is accepted. Send all contributions to the Editor, G. C. Backhurst, Box 15194, Nairobi, Kenya.

East African Bird Report

This normally forms the third issue of *Scopus* each year. Records from Kenya, Uganda and Tanzania are welcomed. Please send them as soon as you can to D. A. Turner, Box 48019, Nairobi.

Records of rare birds are assessed by the internationally-based East African Rarities Committee. If you see a rare bird, it may help to telephone one of the OSC members so that someone else can see the bird.

Ringing scheme of eastern Africa

This covers several countries in the area. Qualified and aspiring ringers should contact the ringing organizer, Box 15194, Nairobi for more information.

E.A.N.H.S. Nest Record Scheme

Details of most kinds of breeding activity are required by the scheme. Nest record cards may be obtained free of charge from the Nest Record Scheme organizer, E.A.N.H.S., Box 44486, Nairobi.

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